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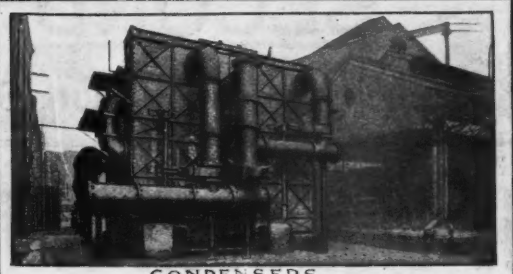

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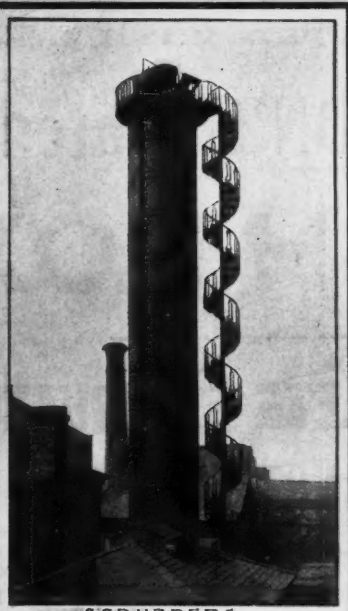

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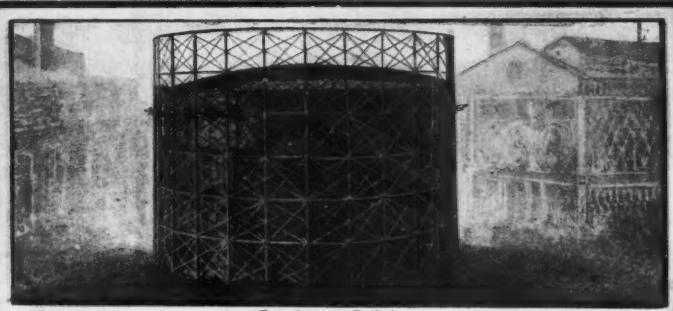

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EDITORIAL NOTES—GAS, &c.

Mr. George R. Hislop on Coal and Carbonization.

THE Scottish Gas Managers, at their informal meeting last Wednesday, had the felicity of welcoming into the chair one who occupies an estimable position in the very front rank of British gas engineers. Mr. G. R. Hislop has been a worker of great worth in the gas industry; he has been one who has delved for truth, and, having found it, has shaped his practices accordingly, and enriched the industry by so doing. Many are the men to-day who, guided by the wealth of the practical experience of this worker, feel themselves on the safest of lines. For some time past, Mr. Hislop has kept himself somewhat in retirement—only occasionally appearing at the assemblies of his fellows in the professional world; and we therefore congratulate those of our Scottish friends who were instrumental in persuading him to take the chair at the Informal Meeting—the twenty-fifth anniversary of such meetings—in Glasgow last Wednesday.

It is good at all times to get an address composed of experience upon which a large mental capacity has been brought to bear. But such deliverances limit the scope of the critic. The address before us is such a one. It is composed of substance that commands commendation and respect; and in that substance there are few interstices into which criticism can be inserted. The first subject upon which the Chairman treated is that very live one for all industries and householders—coal; and we are glad indeed to find that it is our good fortune to be shoulder to shoulder with Mr. Hislop in views pertaining to this most momentous question. It is to be fervently desired that all would similarly view it from a national level, and not from the lower one of political partisanship. If all would do this, there would be less foolishness and more philosophy found in current speeches and writings on the subject. The Chairman is of the same way of thinking as Sir George Livesey—that one thing that is wanted is a reimposition of a tax on exported coal of 3s. or 4s. per ton—the former suggesting 3s. per ton for foreign vessels, and 2s. to 2s. 6d. for British vessels. Precious little is heard to-day about the terrible ill-effects of the coal tax. The lamentations and the murmurings over the drawbacks and injuries that the country and the people were suffering from the tax during its existence, which neither before nor since have been confirmed in even partial degree, are wholly hushed. The laying to waste of colliery villages, the starving families, the ruined shopkeepers—where were they before the tax was discontinued; where have they been since, with coal 4s. and 5s. above the prices that ruled when the tax was levied? It incenses one to think to-day of the unworthy appeal to sentiment and sympathy to gain an end that has taken out of the public purse millions of money, and has not benefited the country one iota. The Chancellor of the Exchequer has a surplus for the past financial year of three to four millions; and had Mr. Hislop been in Mr. Asquith's shoes, the purchasers of British coal from abroad would have raised that surplus to perhaps ten millions, without in any way inflicting those mythical injuries that were disgracefully dragged in as argument for attaining abrogation. The attitude of the Government in this matter is most difficult to understand. On the one hand, they repealed the coal tax which was paid by the people of other countries. On the other, they are taking a course that will do great injury to this country by raising the price of coal at least (excellent advisers assure us) 6d. per ton more than the old tax stood at on exported coal; and this on the millions of tons more coal that are used at home than are exported. Well did Mr. Hislop characterize the measure of the Government as the "absurd Mines (Eight Hours) Bill." This absurdity the Government are intent on pressing forward in the mistaken notion that they are serving the interests of a small section of the community. The people of this country, however, have not been educated up to such a height of altruism that they will willingly make such sacrifices as are demanded of them on this occasion. The outcry that has consequently been raised only angers the Government, and causes them to forget that they are, after all, the representatives of the people, and that their acts will eventually come up for judgment by them.

Who can speak with greater authority or didactically on carbonization and coal testing than Mr. Hislop? The parts of his address treating of these subjects will be turned to with much interest at this time. The varied and conflicting phenomena of carbonization are indeed worth attack by the highest intellects; and, fortunately, they are being, so far as opportunity permits, energetically attacked. While waiting the issues of practical investigation in the new directions, we are also looking forward with considerable expectation to the results of the inquiry and pilgrimages of members of the Carbonization Committee of the Institution of Gas Engineers. But that by the way. Great as has been Mr. Hislop's assistance in raising the scientific level of coal carbonization for gas production, he it is who, in this address, denotes by his words that the best of the past has not represented anything like finality in perfection. "It is evident," he remarks, "that we are upon the threshold of other important "developments." There is no doubt as to this; and we are getting, day by day, a closer knowledge of the directions from which those developments will come. But Mr. Hislop seems to confine his view, in speaking of these important changes, to the south and the west—to the vertical retort with a continuous feed of coal and a continuous discharge of coke, and to the coke-oven system as worked (it is said in the address) "so successfully" in America. Later, it is true, he incidentally mentions the Dessau system and Mr. Love's work with retorts inclined to 45°; but it is clear he looks upon the continuous vertical retort system and the coke-oven system as the premier rivals. He regards the former system as an attractive one; but he warns of difficulties to be encountered that require careful consideration and study. "Careful consideration and study" have been the excusable and proper causes of the absorption of the considerable time between birth and maturity of the continuous system. One of the "difficulties" is stated thus in the address: "It is, for "instance, a nice point to determine at what part of the "retort the gas should be taken off, so as to avoid undue "contact with hot coke, and consequent decomposition of the "gas, on the one hand; and avoid its removal too near the "charging end without being subjected to the heat neces- "sary to crack up into permanent form the more condensable "vapours in the gas, on the other." Truly, well said; but tests and analyses certainly indicate that there has been discrimination in the one continuous system now under daily operation as to the point of gas exit from the retort, and that, at all events in that system, any fears on these points are shown by result to be groundless. It is not meant by this that there may not henceforth be improvement in this respect; but judging from what we know of the Bourne Valley (Bournemouth) working and the critical testing methods there, suspicion is not aroused by the cautionary remarks in the address.

In connection with this question of carbonization, the Chairman (like, recently, the President of the Midland Gas Association, Mr. Harold E. Copp) referred to the publication in the "JOURNAL" of a description of a combined producer and inclined retort, as schemed out by Mr. J. T. Westcott. Editorial reference was made to this combination on Feb. 4; and the only point about it that it is now desired to allude to is Mr. Hislop's statement that the projected system is patented. This is not so. Mr. Copp said that the process, with its great yield of 6·65-candle power gas of 407 B.Th.U., seems to be a feasible one; and for what the process is worth, Mr. Westcott has made a free gift of it to the gas

industry. But the new systems of carbonization for gas production, with all the effort and intellect at their backs, are not going to have a walk-over. The great improvement that has been effected in horizontal working by the ingenuity of the makers of stoking machinery in the realization of greater economy and speed, have made the more difficult the conquest of the old by the newer carbonizing methods. Still it will not be long before in this country, as the Dessau system has already done on the Continent (as shown by the figures published in the editorial columns on March 24), they will take a prominent place in the operations of gas-works. Of that we feel very confident.

As was to be expected of one with such a special and varied experience in the assaying of coal for its manufacturing value to the gas maker, Mr. Hislop dealt with the importance of care and frequency in the testing of coals. In this matter there are many pitfalls; the old master hand has found them and profited thereby. He indicates some of them in his address; pointing out particularly the differences that defective temperatures and varying quantities of water in coal have upon the results obtained experimentally and in practice, more especially when the summer experiment and the winter working are brought into contrast. A high percentage of water in coal has a very bad effect upon carbonizing temperatures and results; and what that bad effect approximately amounts to may be found in the instructive speech that Mr. Hislop made on Mr. John Bond's paper at the Institution meeting in 1905. The principle upon which coal is bought—of productive value being the test of purchasing worth—is not, unfortunately, always applied to contracts for plant and applications of method. More is the pity; for very frequently it might be found that the payment of a price somewhat in excess of the lowest tender would give improvement engendering such economies in working that the difference would be recouped over and over again during the effective life of the plant. Cases are known where the wear and tear alone of the plant has been the sole basis of rejection without reference to savings and efficiency!

Some useful experiences are recorded regarding purification; and towards the end of the address, there are computations as to the relative money values of gas and electricity from the point of view of lighting efficiency. Electricians who consider these figures will note that the gas with which comparison is made is of 20-candle power; and gas engineers, and Mr. Hislop among them, will admit the fairness of our objection to the comparisons between high-pressure gas lighting and electric incandescent lamps—whether carbon filaments or Osrams. There has been protest time after time against electricians comparing arc lighting with ordinary incandescent gas-burners; and we can at least set them a good example by abstaining from copying their basic inequalities in this regard. However, no one will peruse the address without realizing that he has been in touch with the opinions and experiences of an ardent worker through a long past in the profession of gas engineering and management.

Ignoring Town Gas—Gasification of Peat.

In tracing the development—actual and potential—of the economies of fuel, Professor Vivian B. Lewes, in his final Cantor Lecture, carried his audience to the subject of the production of gaseous fuel and therefrom of power; but he had little or nothing to say of gas-works as centres for the production of gaseous fuel for such purpose, other than in a table to point out that, according to what is obviously an incomplete calculation for producer gas, it costs only one-third that of coal gas per brake-horse-power. But with a magnanimity that deserves special recognition, the Professor reserves an opening for gas-works to contribute to the fuel economies of the time by (some of these matters were criticized last week) saddling them with low-temperature carbonization, a speculative and highly competitive business in residuals, a low make of coal gas, and the privilege of supplying a suitable fuel for suction-gas plants. For these small mercies may we be truly thankful. The gas industry will not care to be pushed into the background of the power business by one of their especial friends, after the manner of some of the gas-engine makers with suction-gas plants for sale—forgetful that it was the gas industry that helped them to lay the foundation of their businesses, and contributes now in no small measure to their maintenance. But, notwithstanding this slighting of the gas industry, it is well known that, within certain power limits, town gas can, and does, hold its own in the esteem of motive power users; and though there have been losses by the industry to suction gas, there have been returns and further gains of custom. The availability, constancy, and inclusive costs of town gas are the causes of this; and these are valuable properties to the manufacturer. With all that has been done by competitors, Mr. Dugald Clerk estimates that from 15 to 20 per cent. of the town gas manufactured in this country is used for power purposes; and even the smallest of the London Gas Companies—the Commercial—in their latest pamphlet, entitled "The Cheapest Power," state that they supply about a million cubic feet of gas daily for gas-engine use alone, which, we calculate, reckoning only working days, represents about 10 per cent. of the Company's total sales, including the public lights and Sunday consumption.

In his lecture, Professor Lewes points out some of the disadvantages and the advantages of suction-gas plants; but he has not catalogued all the former, and among the latter he refers to the "wonderful elasticity" of such plants and the smallness of the stand-by losses when the plant is not doing work. With regard to the "wonderful elasticity," the plants especially show it in the disuniformity of the gas produced and the resulting work of the engine. As to stand-by loss, Professor Lewes should also consider costs in relation to load, as did Mr. F. C. Snell in his paper before the Institution of Electrical Engineers ["JOURNAL," Jan. 28, p. 215]; and then he would find that the whole story is not summed up in the easy-going statement as to the "smallness of the "stand-by loss when the plant is not doing work." Then, again, as to the economy of fuel being very great—"the "average consumption being 1 lb. of anthracite per brake "horse power"—that is something that is only attainable under ideal conditions of working with a constant load. Or take the cost of 0·10d. per brake horse power given for power gas in the table as against 0·30d. for town gas, the 0·10d. does not, under very general conditions of working, represent anything like the actual expenditure for fuel alone, and therefore does not include suction-gas plant capital charges, wear and tear, depreciation, water, labour, "moral and intellectual damages" produced by breakdowns and irregular working, and other items that do not fall on the manufacturer using town gas on tap constantly at his gas-engine. If we look again at the Commercial Gas Company's pamphlet, there the testimony is seen of the Manager of the Caxton Press, Limited, that, owing to the unpurified state of suction gas, their engines have to be cleaned much more frequently; that the supply is so often irregular as to dislocate their working arrangements, making the output of the machinery most unreliable; and that, in computing the cost of suction gas, charges for labour, for wear and tear, depreciation, and interest on capital are very generally overlooked by those interested. In this same connection, the criticism and calculations, from actual installation experiences, in the Presidential Address of Mr. T. Duxbury to the Manchester Institution a month or so since might be quoted. However, in the opinion of Professor Lewes, what is now needed to complete the success of the suction-gas plant is a generator for a small-sized installation which will be available for use with bituminous slack, so as to rid the manufacturer of any dependence upon the costly anthracite. The difficulties of tar and uniformity in the composition of the gas are serious obstacles to the perfecting of such a plant; and, moreover, the field for a small plant of the kind is just the one wherein, above all others, town gas can hold its own, and with a good favourable balance to boot.

In the concluding part of the lecture, Professor Lewes expressed some sanguine views as to the utility of peat as a fuel for gasification and treatment for the recovery of sulphate of ammonia. There has been a large amount of trial work in this direction, but little of a continuous practical nature in these isles. In his analysis of samples of peat, Professor Lewes has done somewhat better than previous workers in regard to nitrogen and sulphate of ammonia; but the wide differences in these respects between the published results of research leaves one very dubious as to the maintenance in practice of the best results recorded. It was rather singular, but appropriate, that the Dublin and Central Ireland Electric Power Bill should have come before a Committee of the House of Commons on the day that this particular question was being handled by Professor Lewes. But the decision of the Committee cannot be taken as a repudiation of the favourable views of Professor Lewes (which were in effect transmitted to the Committee by the witnesses for the promoters) on the question of the value of peat. The Committee had something more than that to

consider. There were the financial and the commercial prospects; and no doubt on those grounds, much more than on the technical one, was based their decision to reject on account of impracticability. When commenting on the scheme on Dec. 10 last, it was remarked that it looked well enough on paper, but that in practice quite a different aspect might be given to the results. There was altogether too much speculation about it to please the Committee; and it is indeed quite time that Parliament (it would have been better had they done so earlier) gave more protection to the public by refusing to put upon such power schemes—whether gas or electricity—the dignity of parliamentary sanction before something of a more practical nature has been done than was, for example, presented on this occasion. There have been several castles built in the air of the Committee-rooms of late years; and, while they have there vanished after their admiration, they have been the cause of the wasting of much substance contributed by an all too credulous public. It is all very well to point out the ways to the economizing of fuel; but it is false economy that calls for prodigality in other directions in order to secure it.

Port of London Bill and Thames-Borne Goods.

To all gas companies whose coal and other materials are Thames-borne, the Port of London Bill that the President of the Board of Trade introduced in the House on Thursday night will have interest, and will demand of them particular consideration—from the point of view of the at present unknown effects of the scheme upon the costs of water conveyance, and also with regard to proper representation upon the new authority that is to be constituted if the Bill becomes law, as there seems now every likelihood that it will do. The question of petitioning against the Bill is one that is now under consideration by various administrations; and, when it is recognized that there is more that will grow out of the Act than is actually in the Bill itself which will affect interests in the future, the attitude that should be taken in the present, it would seem, is for every undertaking to put itself in the best position for watching as narrowly as possible the progress of the measure. At the moment, until there is further discussion and revelation, it is impossible to determine whether to give a qualified support or opposition to the Government's intentions. There would not be much use in this instance in showing any unmeasured hostility, because in the Bill, whether or not in all particulars approval be accorded it, there is the most complete solution yet offered of a complex problem, in regard to which it has been consistently admitted since 1900, and more especially since the Royal Commission on the Port of London reported in 1902, that something drastic must be applied to place the Port of London in the position that it should occupy, and to give to London something more from its heritage in the River Thames than it has hitherto had through the absence of a controlling body with wide and complete powers. Public interests cannot be sacrificed to sectional interests; but sectional interests must see that they are properly represented, and that there is no undue oppression.

We have something that is altogether new and unexampled in respect of magnitude and power in the body that the Bill proposes to set up; and therefore there is need for caution and not violent rush, because it is not inconceivable that a body with such authority as it is contemplated to repose in this one, could do as much harm as good to the Metropolis. There is, however, the particularly gratifying feature about the body that there will be a preponderance of traders and shipowners in its constitution; and they are sure to proceed warily, so that the interests of trade and shipping are not unduly affected. This is a most important safeguard; and it is upon this safeguard that the Gas Companies who are largely dependent on the Thames for cheap carriage must keep a circumspect eye. As the world now knows, the Board of Trade have, subject to the confirmation of the shareholders, agreed with the Directors of the three great Dock Companies for the transfer, on terms, of their undertakings. These Companies, and the Thames Conservancy up to Teddington, and the Watermen's Company are to be superseded by the new authority, which is to consist of 25 members, fourteen of whom are to be elected (as already mentioned) by traders and shipowners; the remainder by the public bodies specified in the Bill. But it is the fourteen who are important to those using the river for the conveyance of their goods, including coal; and the fourteen are to be elected by the payers of dues, the owners of river craft, and wharfingers. One strong reason for common action in representing the views of those having so large an interest in the matter (on behalf of the public as well as of themselves) as the gas undertakings using the river is that the Board of Trade—as no register of the electors can be prepared at the outset—are going to appoint the first fourteen members; and these (particularly as, in a sense, they will be the nominees of the Board of Trade) may, we do not say will, use the distinction they will thereby gain to secure re-election.

Now about the second point. The new and powerful authority are not only to control the dock property that comes into their possession, but they are to build new docks and works, and to plan and carry out large improvements in the river, and maintain the improved state. In one way, this will be of great benefit to users of the Thames for goods carriage; but, so far as the gas undertakings are concerned with their daily and all-the-year-round traffic, and great tonnage, the benefit of the improvements may be purchased too dearly. The revenue that will automatically pass into the hands of the new authority, if the Bill succeeds, will, it is quite patent, be inadequate for their needs. The works that they will have to execute have been described as "works "of time," which signifies something both extensive and expensive. Therefore there are to be new sources of revenue; and the extent to which these will be drawn upon will be of the utmost importance to the gas undertakings situated on the banks of the river. In the first place, the new authority are to have the power to levy port dues on goods. When introducing the Bill in the House, Mr. Lloyd-George stated that a schedule of maximum charges will be proposed; but it looks ominous when the right honourable gentleman adds that he hopes it will not be necessary to make the charges "very "heavy." That is a matter on which, in considering the Bill for the purpose of determining attitude, one is greatly in the dark, and likely to continue to be for the present while the Bill is getting well on its journey; for the schedule, it is understood, will be prepared by the Board of Trade later on, and will then be submitted in a Provisional Order for confirmation. The second source of new revenue is to be a uniform maximum tonnage due of 1s. 6d. per ton; the third, registration fees on barges; and the fourth, a continuance of the increased Conservancy dues for river improvement which would otherwise have terminated this year. Beyond this, the Board of Trade reserve power to compel the levying of additional taxation if a deficiency in the Port fund is probable. In short, the new authority, with a great unknown work before it, is to be self-supporting; and all from whom they can command tribute under their wide powers will have to pay. The goods that were imported, exported, and transhipped at the Port of London in 1906 aggregated something like 29½ million tons, of which no less than 8½ million tons was coal. A considerable proportion of this, it may safely be said, was for gas-making purposes. The large tonnage of goods that has hitherto got off very lightly in the Thames, and the growing system that has not been of benefit to the Dock Companies of discharging overside into barges, will all, under the new order of things, be laid under contribution through the new sources of income. However, with a comparatively small municipal representation on the new authority, and a preponderance of traders and shipowners, there should be management with economy and efficiency of the admittedly large ministerial and creative obligations which it is proposed to impose upon the authority.

Position of the West Ham Electricity Department.

Readers will have noticed that, in these columns recently, the officials of the West Ham Electricity Department have paid a good deal of attention to our comments on matters with which they are concerned; and we were promised something over which those officials could bid us come and rejoice with them in regard to the profit resulting from their activity during the current financial year. If reliance can be placed in our local contemporary the "Express," there is to be disappointment in this respect. It is stated that, in a report the Finance Committee have put before the Council, this remark appears: "Your Committee point out that there is nothing included in the above [estimate] respecting the electricity undertaking, as they have not received any estimates from the Electric Lighting and Tramways Committee." The reason for this is perhaps not far to seek. There has been a very serious report as to loss on the department from the Borough Treasurer; and there is much searching of accounts.

There seems ground for hoping that the loss is not nearly so great as it appeared at first blush; but there is very little hope of showing anything but a loss. Alderman Littler, the Chairman of the Electric Lighting Committee, some time ago prophesied a profit; and we have recollections of a pious desire on his part, if the department did not get £3000 profit in the financial year, to be kicked out of the chair. If he is taken at his word, there is already a fair prospect of the hasty vacation on his part of the seat of honour; for, according to our contemporary, a loss of about £6000 is the result of the year's working. We join in the hope that there will be some trustworthy explanation forthcoming, in view of the premature boasts that have been made. Without doubt, there has been a great deal too much over-straining of the concern in low-priced business, and in spending money on small custom that can hardly pay the department for the expenditure incurred. The original estimate upon which the profit of £3000 was to be made would now be very interesting reading.

Look to the Coal-Breakers.

It is with considerable regret that we have to report a fatal accident, of a peculiarly painful character, at the East Greenwich works of the South Metropolitan Gas Company. It was in the fullest sense of the word accidental; and no blame in any way, or charge of inadequate protection, can lie at the doors of the Gas Company in regard to the matter. The facts of the case are reported in another column (p. 42); but they amount to this, that one of the coal hands, while working at a coal-breaker in operation, fell into the hopper, and before his comrade could stop the gas-engine, the whole body of the poor fellow passed through the breaker, and was reduced practically to a pulp. There was a guard round the hopper; and a Factory Inspector who has visited the scene of the accident states that everything is in conformity with the requirements of the Act. To have this official declaration must be a great relief to the Directors and chief officials of the Company, and especially to the Engineer at East Greenwich (Mr. Joseph Tysoe). Every reasonable thing that human thought can devise is done at the works of the Company so as to prevent any accident to the workers; but even co-partnership, which gives representation on the Board to the workmen, the jury system in connection with accidents, and the personal (apart from the humane) interest of every worker to shield his fellows against bodily injury, cannot provide against a pure accident of this kind. But such accidents carry warnings; and the shocking character of this one will induce every gas engineer to see that there is no coal-hopper with a breaker at the bottom that is not properly railed round, so as to ensure as far as is possible that no false step or slip on the part of passers-by or of men working in the vicinity shall precipitate anyone to death in so terrible a manner. Fortunately in this case, the breaker was properly guarded; and the accident was one that no prior special protection could have obviated.

Gas Profits at Stockport.

The old question of the appropriation of profits on municipal gas undertakings in aid of the rates was raised at a meeting of the Stockport Town Council some days ago, when it was reported that the Gas Committee had resolved that for the year ending the 31st ult., the sum of £15,000 should be handed over to the Finance Committee for this purpose. The amount named constitutes, it seems, a record for Stockport, and represents something like 9d. in the pound on the rates. To this extent, therefore, those ratepayers who do not consume gas are being benefited at the expense of those who do. Such a state of affairs, while pleasant enough for the citizens generally, was almost bound to give rise to some difference of opinion in Stockport, as has been the case in other towns. As a matter of fact, one member moved (as an amendment to the motion for the adoption of the Committee's minutes) that the price of gas should be reduced 3d. per 1000 cubic feet, with a proportionate allowance to prepayment meter users. The Mayor, however, refused to accept this; and the amendment was thereupon altered so as to exclude from the minutes adopted the one having reference to the handing over of the profits. But the amendment was not in this form successful; the voting being more than three to one against it. This led the Chairman of the Gas Committee to remark that the supporters of the amendment were growing, and to tender the advice that further attempt in the same direction might be made in another twenty-five years. This is a long time to look forward to; and a statement that on the previous occasion when the same councillor brought forward the same objection to the disposal of the profits he had not a single supporter, whereas last week there were nine on his side, would seem to hold out sufficient promise to justify a somewhat earlier renewal of the effort. At the same time, it must be admitted that there is a certain amount of doubt as to exactly what form it is desired the change should take. That the gas consumers—and not those who choose to adopt electricity or suction producer plants—should enjoy the fruits of the undertaking whose success they have brought about, is understandable, and it is the view of the matter which we have repeatedly urged. Here the contention is put forward that the profits are being unequally distributed among the ratepayers; but inasmuch as this is followed by the argument that "those who do not consume the gas ought not to share in the profits," it may be assumed that what is wanted is not that the profits "should be equally distributed among the ratepayers," but that they should be handed over to the consumers in the shape of such a reduction in price as was suggested in the amendment first proposed. In favour of this argument, it may be remarked that, inasmuch as the price of gas is not a fixed quantity, it would (in the event of the results proving less satisfactory than at present) be the consumers who would have to pay a higher price for their gas, and not the general body of ratepayers who would be called upon to meet the deficiency. However, whatever differences of opinion may exist on some points at Stockport, it is gratifying to see there is general agreement as to the excellent position occupied in every respect by the Gas Department.

Gas Consumers and Ratepayers Studied at Lancaster.

The short account given by Mr Alderman Helme, the Chairman of the Gas Committee of the Lancaster Corporation, of the progress of the gas undertaking in the past year, as recorded in another column, is interesting from the fact that it affords proof of the desire of the Committee to deal with the profits in a way which will give satisfaction alike to the ratepayers and the gas consumers. There was an increased sale of gas last year to the extent of 10 million cubic feet, compared with the previous year; and this strengthened the financial position of the Committee. They made a profit of £5407; and out of it, in reduction of the rates, the provision of the public lighting, and the addition to the reserve fund, they contributed £4200 to the town. With the result of the past year's work before them, and in view of the steady development of the capital value of the undertaking, the Committee thought full justice had been done to the ratepayers, while by lowering the price they had endeavoured to meet the convenience of the consumers. Further carrying out this policy, they asked the Council to sanction a reduction to 2s. 1d. per 1000 cubic feet, with a cash discount of 2d., for ordinary consumers, and to give the users of prepayment meters 3 cubic feet more for 1d. Alderman Helme closed his remarks by assuring the Council that the gas undertaking was in a very satisfactory financial condition; and he acknowledged the services rendered by the Engineer and Manager (Mr. Charles Armitage, Assoc.M.Inst.C.E.) in the production of the excellent results the Committee had been able to submit. These complimentary references were cordially supported by Alderman Bowness, who said the Committee were greatly indebted to Mr. Armitage for the success which had attended the spirited policy that the Council allowed them to inaugurate two or three years ago. Other remarks of a congratulatory character were made, and eventually the Committee's recommendation was adopted.

Manchester Electricity Exhibition.

The preliminaries for the Electrical Exhibition at Manchester this year are progressing apace; and the Executive Committee are fortunate in having obtained the sympathy and blessing of the City Council. The Committee have received an offer from the Corporation of a site for the exhibition on part of the Platt Hall estate, which was recently purchased by the Council. The site adjoins one of the main roads leading from the city, and is in one of the most important residential districts. The offer has, naturally, been accepted. It is stated that the Committee have already received sufficient support to assure the success of the exhibition. Even the Olympia Exhibition of 1905 is to be exceeded.

The building that it is proposed to erect is to have a considerable floor space, so as to give room for a thoroughly representative display of electrical apparatus, and of the application of electricity in industrial operations. It is intended that this display shall not be carried out in any half-hearted manner; but notwithstanding the statement as to the promises of support having been sufficient to assure success, the Committee are showing a little anxiety to get early information from all who are willing to take part (as exhibitors) in the movement. Their anxiety is easily understood, seeing that the expenses will be anything but light, in view of the fact that the Committee are starting with a naked site, and are erecting special buildings for the exhibition.

NOTES FROM WESTMINSTER.

THERE has been very little doing in the Committee rooms this week. Few Committees have been sitting; and there has been comparatively little work for them to do. There will be an inordinate "long vacation" this year for a good many who practise at Westminster; but they, like those engaged in commerce, are bound to have their lean as well as their fat years. The principal matter to arouse interest in the past week was the Dublin and Central Ireland Electric Power Bill, which proposed the gasification of peat for the production of gas and sulphate of ammonia. The gas it was intended to utilize for driving gas-engines for the generation of electricity. The proceedings are noticed below, as well as in our "Parliamentary Intelligence" (p. 37). The gas clauses of the Leicester Bill have been approved by the Police and Sanitary Committee. The Blackburn Corporation Bill has also been before the same Committee; and the whole of the gas clauses that were in the deposited Bill will not appear in the Act. The only other matter was the rejection of the Slough Bill.

A Peat-Gas-Electricity Scheme. Ireland was well represented before Mr. Luke White's Committee on Monday, Tuesday, and Wednesday last week; and among the visitors was noticed the Secretary and Manager of the Alliance and Dublin Consumers' Gas Company (Mr. Francis T. Cotton). The measure before the Committee was the Dublin and Central Ireland Electric Power Bill, which had for its plausible object something great for Ireland, and something greater for those who placed their confidence and money in it. But the likelihood on the evidence was that it would be one of those hideous failures of which we have had not a few examples in the power scheme line. Take the worst of any of the areas obtained in the past by power companies, and in this new scheme there is found one still worse. It was not a case of a commercial undertaking going to a field prepared for its entrance, but an undertaking whose promoters vainly hoped that its own charms would attract enterprises that would be its customers. There were several opponents; among them being the Dublin County Council, the Dublin Corporation, and the Gas Company. We need not (as particulars are printed elsewhere in this issue) give here any information as to the area the new Company purposed taking in, nor anything about their scheme, beyond saying that it was proposed to produce gas from peat, and to use the gas in engines to generate electricity; the promoters proposing to "knock spots" off generating cost records by producing at the rate of 0·05d. per unit. Sulphate of ammonia was to be a bye-product of the gasification of the peat; and the profits on it, if present market prices for sulphate of ammonia were maintained, were to about pay the expenses of the fuel. Peat gas, according to the expert witnesses, has many more virtues than coal gas for engine driving; and the evidence would only require to have been carried a shade further to have heard that the use of the gas has an improving tendency on the engines themselves. What the evidence all came to was, that dealing with peat in the manner proposed was such an excellent and profitable thing that the electricity itself could be almost looked upon as the bye-product, and nearly given away. Hypothesis, assumption, and kindred intangibility were rolled out with glorious zeal to persuade the Committee to allow the scheme to go forward, and to give the promoters a capital of £450,000 and £150,000 borrowing powers with which to speculate. Both Sir Ralph Littler, K.C., and Mr. A. M. Paddon, in their cross-examination for the Gas Company, did much towards showing the utter hollowness of the project, and the baseless character of the estimates as to the future. With the Dublin County Council and the Corporation against the scheme, the decision of the Committee that they could not find the preamble of the Bill proved, in view of the fact that the promoters had not satisfied them as to the financial and practical character of the undertaking, can hardly be challenged by the cry, "Another injustice to Ireland."

Slough Purchase Rejected. It will be remembered that, as the Slough Water-Works purchase question was left by Sir Henry Kimber's Committee the previous week, it practically confided to the discretion of the Water-Works Company whether or not the Bill should proceed, and whether they should part with their property on terms the minimum of which was named by the Committee. Tuesday morning last was fixed by the Committee as the time when the parties were to re-appear before them, and state whether agreement had been arrived at and the terms, or whether the Committee were to give the (for the Company) "happy dispatch" to the Council's Bill. The Committee heard that the Company had named a price; but it was one that, according to Mr. Wedderburn's manner of expression, only "lunatics" would accept, and we can understand that the District Council were not agreeable to subscribe to any act that would ensure for them the title to such classification. It is quite a common thing for an owner (say) of a picture when it is "hung" to place a prohibitive price upon it when he does not desire to sell; and apparently this was the position of the Company. However, the Committee made no trouble over the matter. They found that no case for compulsory purchase had been made out; and they declined to put compulsion on the Company in any shape or form. Therefore the Bill had to go.

Consumers in Arrear. For three days last week the Blackburn Corporation Bill was before the Police and Sanitary Committee of the House of Commons; and on Wednesday the part was reached which refers to gas and electricity supply. When dealing with this measure on Jan. 21 last (pp. 150 and 154), certain novelty in the clauses was pointed out. There were the clauses, for example, in which the Corporation, being the owners of both the gas and electricity undertakings, desired the right, if a consumer was in arrear with his payments for one commodity, and was a user of both, to put on pressure for payment by cutting off both supplies; or, if a consumer was in arrear with his payments (say) as a gas consumer, they asked to be empowered to decline to serve him with electricity if he applied for a supply on being deprived of gas, and *vice versâ*. In other words, they desired to get payment, and quite right too, by putting the bad payer into extremity in regard to lighting. The cutting off of a supply in cases of a consumer being in arrear is the right of each undertaking separately; and as was suggested in our columns on Jan. 21, such an innovation as the Blackburn Corporation suggested here could only be born of experience, and so it was proved in the evidence. But the Committee would not allow an extension of the existing power in the manner suggested; their view being that each undertaking must in this matter be treated as a distinct concern under different administration. We wish Parliament would enforce this principle in the case of all matters affecting municipal trading undertakings; for there are not a few municipal gas undertakings that would have been the better off for it to-day. When the Blackburn Act is printed, it will be found that one or two other gas clauses have been brought up to "model" form. The Gas Engineer (Mr. S. Ogden) was up giving evidence for his department. The water clauses of the Bill were passed.

Leicester Gas and Water. Extension of the area of gas supply and the application of the modern gas-testing clauses were the principal points that appealed to us in connection with the Leicester Corporation "Omnibus" Bill when before the Police and Sanitary Committee. The Committee had no difficulty in assenting to the clauses after Mr. Alfred Colson, the Corporation Gas and Electricity Engineer, had shown the magnificent position of the gas undertaking, and its development over the past thirty years. Exactly what the Corporation were asking for in these respects will be found set forth in the "JOURNAL" for Jan. 21, p. 154. The water clauses of the Bill required greater explanation. It is proposed to extend the limits of supply, and other powers of somewhat minor importance are requested. But one that claimed closer consideration was with respect to the increase of the water-rates by 2½ per cent. In connection with the Derwent water scheme, the Corporation's financial obligations demand more revenue; and it is imperative they should have it. An examination of the figures placed before the Committee leaves no doubt that the plans of the Corporation for meeting the liability are the best that could be devised, and the plans that will prove the least burdensome upon the consumers, though it may be expected that many will object to pay more for water, but they must console themselves with the thought of the favours to come, and the future improvement and certainty of the supply. The Committee were agreeable to the Corporation requirements in this regard. Mr. Frederick Griffith, the Corporation Water Engineer, was present in connection with this part of the Bill.

Scotch Water. Mr. Luke White's Committee have had a busy time with measures Scotch and Irish. Before they took in hand the Dublin and Central Ireland electricity scheme, they devoted seven sittings at least to the consideration of the Motherwell Burgh Extension Bill. At intervals during the proceedings, there was discussion as to the question of safeguarding the water-supply rights of the Lanark County Council in the annexed area; and the Committee before they allowed the Bill to leave them, made the protection of those rights a certainty by dropping in this brief but comprehensive and effective clause: "Nothing in this Act, or in the Burgh Police Acts, or the Public Health Acts, shall authorize the Town Council to supply water, or to levy rates for the supply of water, within the districts annexed, or prejudice or affect the rights and powers of the County Council or the District Committee within the districts annexed

under the Lanarkshire and Middle Ward District Water Acts, 1892-1902."

The Old Picture and the New.

It is not often that electrical matters are dealt with in these notes, with the exception of the perennial one of the electric supply projects for London. But just recently a sorry tale was laid before Lord Wenlock's Committee as to the position and affairs of the South Wales Electrical Power Distribution Company; and hearing that tale, memory flies back to the times when this and other electric power schemes were before Committees in these very rooms. Pictures then painted in roseate hues, and with adroit hand, by counsel and electrical experts, are looked back upon, and compared with the actual pictures of the present. Electricity for power was, we were told, badly wanted; industries were famishing for it. The world has rolled on; trade has prospered; and, with perhaps the exception of one Electric Power Company whose lines are cast in pleasant places for their special purpose, the others have moved along at but sluggard pace, or have done little or nothing to develop their respective schemes. It was all speculation; and nothing was done by Parliament towards protecting the public from speculators and isionaries who had parcelled out to them practically the whole country before anything was done to prove the requirement. The South Wales Company did move; and many are the people who are sorry that they did so. Prophecies and expectations, which time has proved were founded on shifting sands, have not been realized; and the banging of the big drum has now completely ceased. The Company have raised a total capital of £850,000, one-fourth being in debentures. On capital account £650,000 has been spent; and the remainder has been swallowe d up in other ways. Resources are exhausted; credit gone; and capital cannot be raised. Contracts for electricity supply were entered into at ruinous prices; and the customers afterwards voluntarily agreed to pay higher prices. An attempt is to be made to save something. A limited Company is being formed with a capital of £100,000 (minimum £30,000), for the purpose of working such parts of the undertaking as can be carried on as a commercial success. It has been found quite impossible for the Company to conduct with any success the business at the Neath or Bridgend stations. At each place, the local authority is the Company's only customer. A provisional agreement has consequently been entered into with the Neath Council to sell to them the generating station there, which cost £40,000, for £7000; and the similar station at Bridgend, on which £30,000 was spent, is going for £5000. At Treforest there is a larger number of customers; and a limited Company is working the undertaking there. Negotiations are proceeding for the formation of a similar Company to run the Cwmbran station. All the large creditors have agreed to accept preference shares in settlement of their claims; and liabilities to the extent of £78,000 have been disposed of in this way. The Company's operations last year left a debit balance of £11,771 to add to an accumulated deficit of £61,000; and the debenture interest unpaid has now piled up to £10,000. Therefore the undertaking has about £82,000 of deficit hanging to it. To sanction the various arrangements referred to is one of the purposes of the Bill that came before Lord Wenlock's Committee. The whole intention of the measure is to save something from the wreck, and to henceforth profit from the experience of the past as to supplying at ruinous prices, and from the results of allowing the imagination to take unguarded flights. The Bill proceeds.

OBITUARY.

THOMAS N. KIRKHAM.

By the death, on the 28th ult., at the advanced age of 84, of Mr. Thomas Nesham Kirkham, another of the few remaining gas engineers associated with what may be called the ante-consolidation period of the gas supply of the Metropolis has been removed. Mr. Kirkham was one of the Engineers of the Imperial Gas Company, and held the position till the undertaking was amalgamated with that of the Gaslight and Coke Company in 1876. He then commenced practice in Abingdon Street, Westminster, and founded the business with which his name, in conjunction with those of Messrs. Hulett and Chandler, has since been associated. The firm turned their attention to the improvement of the washing and scrubbing plant employed in the manufacture of gas; and early in 1877 they took out a patent for an improved washer. This was quickly followed by others on the same lines, as well as for dip-pipes (with some of which Mr. Hersey was connected), the series extending over a period of something like thirty years. Mr. Kirkham had not, however, for a long time taken an active part in the business. When he was in the service of the Imperial Gas Company, he held the position of Consulting Engineer to the Dover Gas Company; and this he retained till his death—his name appearing on the Company's last report—though he had not been able to personally visit the works. Early in 1879, just after the electric light "scare" in London, Mr. Kirkham gave an interesting lecture, in conjunction with Mr. T. Hersey, on "Gas Lighting *v.* Electric Lighting." He was at one time Captain of the "H" battery of the First Surrey Artillery, a member of the Institution of Civil Engineers, and a Fellow of the Chemical Society. He was one of the founders of the Evening Star Lodge, and was (in 1878) the second W.M.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 44.)

THE bright change which was noted a week ago as having come over the Stock Exchange did not remain long, and last week was thoroughly disappointing. With strong factors calculated to impart a cheerful tone, with easy monetary conditions, and with a good balance apparent on the Budget, a general move in the upward direction might have been anticipated. But the position was assailed at the point of the gilt-edged market by a force of new issues; and the enormous German loan flattened it with irresistible weight. Other markets sympathized; and though there were some ups as well as downs, prices all round are lower. The opening day, though rather dull, was not uniformly bad; and Consols rose fractionally. But weakness was displayed on Tuesday, and the rise was more than lost. Wednesday was a disappointing day; and the general tendency was all towards realizations. On Thursday, Consols felt the full force of the tide, and gave way ¼. The other markets with few exceptions were in a drooping state. After this, business fell very quiet up to the close. Both on Friday and Saturday the tone was dull and flat; and the gilt-edged division continued depressed. In the Money Market, the tendency at first was towards marked ease. Before the week was half through, however, a change took place, and rates hardened materially, closing firm. Business in the Gas Market was on about what seems to be the average scale of activity at this time, and without any very striking feature. But the consistent firmness of the market is a good point; and though few quotations made any change, they were all for the better. In Gaslight and Coke issues, the ordinary was pretty active at good prices; and a rise in the quotation was effected. The stock was done once at 96⅛ on Monday; but after that it marked 97¼ several times. The secured issues were quiet but strong. The maximum was done at 88 and 88⅛ (a rise of ⅛); and the preference at 108½ and 108¾—quite good enough for a rise. South Metropolitan also showed an improvement on the previous week's prices, and changed hands at from 121¼ to 122½. In Commercials, all issues had one deal; the 4 per cent. at 106½, the 3½ per cent. at 103, and the debenture at 83. The Suburban and Provincial group were even quieter than usual. Bournemouth "B" was marked at 16¼ and 16$\frac{2}{16}$, Brentford old at 243, and Bromley old at 118. The Continental Companies also had little doing. Imperial was steady at figures which ranged from 178½ to 180, Union marked 115 free, and ditto preference 141. Tuscan debentures were done at 98½ and 99. Among the undertakings of the remoter world, Buenos Ayres changed hands at 11¾, Oriental at from 143 to 145, Primitiva preference at 5, and River Plate at from 13⅝ to 13⅞. The Bombay Company's notification of a reduction in the rate of dividend to 6½ per cent. did not lead to dealings.

ELECTRICITY SUPPLY MEMORANDA.

A 200-Volt Metallic Filament—Fire Statistics and Calculations—Electrical Fancies not Facts—The Drury Lane Fire—Some Pictorial Exaggerations—Rural Speculation.

RECKONED as a desirable attribute by some central station engineers, and an undesirable one by others of a more buoyant and optimistic order, has been the fact that the newer metallic filament lamps could, on most electricity systems, only be used in series, unless a transformer be introduced, which is an additional source of expense. From the consumers' standpoint, this is a great disadvantage; it having been found that—except in large rooms where the higher illuminating capability of the metallic filament lamps allowed of a considerable displacement of carbon filaments, yet giving as good an illumination—the old heavy costs attaching to lighting by electricity remained. But now we are told that 200-volt Osram and Wolfram lamps are actualities; and that from April 1 these have been purchasable over the counter. It is stated that the efficiency, life, and mechanical arrangement of these lamps are identical, and that both may be used at will on alternating or direct-current supplies. The 50 candles, of course, is only a nominal rating; the illuminating power being 50 Hefner units—the electrical papers persist in calling the Hefner unit a Hefner "candle"—or (say) 45½ British standard candles. The consumption is 50 watts per hour; and the price per lamp 6s. So that the reputed efficiency is about 1·1 watts per candle per hour. The lamps will not therefore be any more helpful to the electrical industry than were their predecessors in the metallic filament line. The first cost per lamp is heavy, and so will be the price of renewals; and, in regard to efficiency, it is really precisely the same as a pair of the nominal 25-candle power Osrams. The lamp, too, like its predecessors, must only be suspended in a vertical position. But accompanying the news of the advent of the 200-volt lamp is the intelligence that the 25, 32, and 50 candle power lamps for 100-volt supplies, are now made to hang at any reasonable angle. "The filament sags a trifle at first, but the droop does not increase with time, and is not very appreciable." These statements are couched in language that suggests great caution and care in the degree of the angle. The next stage in development that it is hoped to realize is the production of a 32 nominal candle power

200-volt Osram lamp to be "burned" at any angle. Not to be far behind the makers of the Osram lamps, the manufacturers of the tantalum form promise a 32-candle 200-volt lamp, consuming 54 watts per hour. But in this case what seems to be a crude way of attaining a desirable end is being adopted. Within a single bulb, two 16-candle filaments are simply being placed one above the other, and connected in series. The illuminating duty for the consumption is not striking as things now go, and something better will surely have to be done to successfully rival the competing Osram.

A liberal conceit—an extract of inexact knowledge—is found in the writings of some of our contemporaries when treating of questions affecting the competitors gas and electricity. The "Electrician" has animadverted upon the deductions, presented in our editorial columns recently, from last year's London fire statistics. Misleading information, it is said, may easily be drawn from the statistics; and then it is pointed out that the "JOURNAL," "by calculations based on the number of electricity and gas consumers, arrives at the conclusion that, in proportion to the number of consumers, electrical fires are about three times as numerous as those due to the use of gas." "This assumption," proceeds the critic, "of course, ignores the fact that electricity is employed in practically all the largest establishments, while gas is employed in practically only the smaller class of property. Thus the electrical installation at (say) Messrs. Gamage's would be put on the same basis as a four-roomed house lighted by four gas-jets." Now let us see what the criticism amounts to, and whether from it the opening words of this paragraph as to "a liberal conceit" can be justified. In the first place, there is no "assumption" about calculations made by the use of concrete and actual figures. In the second place, in the territory in which a generous figure gives to electricity 85,000 consumers, 1,250,000 gas consumers are to be found, with hundreds of thousands of gas stoves and fires, and an innumerable number of points of use of gas for other purposes. In this tremendous custom, there are numerous installations of gas lighting that will match Gamage's or any other installation that electricity can put forward in respect of magnitude. It is assumption, and absurd assumption, to say that "gas is employed in practically only the smaller class of property;" and the quicker such ridiculous ideas are evicted from the heads of the writers in our contemporaries, the better for those who parade such ignorance before people—before electrical people—who really know better. As a matter of fact, too, gas is supplied to practically every big establishment in London using electricity; and what is more, these establishments would hardly care to be without the convenience and reliability of gas. Truly, it would create surprise among those who write loosely—giving expression to false notions rather than to ascertained fact—if they only knew from daily experience the extent to which gas is used in the "largest establishments" in which electric light is employed.

Our contemporary thinks that a more equitable basis of calculation than consumers, to find the relative fire danger of electricity and gas, would be the number of points at which lamps are in use, or else the number of miles of electric light wires and gas-pipes employed. Very well; we want nothing better than that which is equitable. We will leave our contemporary absolutely free to make the calculation on either basis. The allotted span of man's life is three score years and ten; and there is not a member of our editorial staff who will have spare time during the remainder of his existence to get together the information for the calculation in regard to gas. With, at the outside, only 85,000 electricity consumers in the area of the 29 electricity-supplying undertakings in London and its environs, there should not be the same difficulty. Our friends have made the interesting suggestion; the honour and glory of carrying it out for both gas and electricity may be theirs, if they so desire. Then, further, the "Electrician" points out very truly that it was submitted by us that a considerable proportion of the fires due to gas are caused by negligence, and are therefore preventible. There is no fault to be found with this; but our contemporary "fails to see why a number of the electrical fires should not be equally considered as due to negligence, since they 'may' [not do] arise from a careless replacing of fuses by ignorant people with any handy piece of metal, resulting in large leakage currents instead of merely the melting of a small fuse." In connection with certain electrical installations of which there is personal knowledge in which there have been fortunately not large, but annoying and alarming occurrences, the installations have been made with no limitation of the expense to guard against trouble; and the fuses have been of the best approved by electricians, and inserted with care. We do think that the instances where "any handy piece of metal" is used for a fuse are few and far between. The fuse question is, of course, one surrounded by much difficulty. As a recent paper by Professor Schwartz and Mr. W. H. N. James, read before the Institution of Electrical Engineers, and the discussions on the paper, showed, no positive rules can be laid down in the matter of selecting a fuse. The authors of the paper found no less than seven different factors that had to be taken into calculation. The fire risk, as they pointed out, with metals of low melting-point is due to the scattering of molten particles when the fuse blows, or to the persistence of the arc across the terminals. With metals of high melting-point, there is an additional risk due to the fuse becoming red hot before fusion. Additional points are the liability of some metals, such as zinc, to burn in air at the temperature of disruption, and that in enclosed fuses with indicator wires, these wires practically form an open fuse of small capacity. It is as unprofitable as kicking against a brick wall to try to hide well-known facts.

In the same editorial article, the "Electrician" also asserts that the credulity of the public in matters pertaining to electricity is almost unfailingly taken advantage of by the reporters of the Daily Press whenever occasion offers. "Thus, within a few hours of the recent outbreak of fire at the Drury Lane Theatre, a paragraph appeared in the daily papers giving as a possible cause of the fire the fusing of an electric wire." What is there wrong about giving it as a "possible cause" when the circumstances are all considered? The theatre was closed; the pantomime having been taken off a couple of weeks before. The fire broke out in the night when there were only watchmen and firemen about the place. There was no occasion to strike a light of any kind; the whole place being lighted by electricity. In certain daily papers, a plan of the stage and its surroundings has been published; and on that plan, there is one room marked "electric switch station," and the words are added "where fire is supposed to have started." On the other side of the stage is the stage manager's office, in which is a gas-stove; and an arrow pointing to the gas-stove directs attention to the words "the only gas in the theatre." The stage manager was not at the theatre during the night in question; and therefore his gas-stove was not in use. It is clear that those who prepared the plan, and those who were present in the early stage of the fire, are more capable of judging "where the fire is supposed to have started" than an electrical journalist who, it is to be hoped, was peacefully slumbering at the time. We are not prepared to say the fire was due to electricity; and we are certainly not prepared to say it was not. Electricity is a possible cause; and, to say the least, the circumstances look very black indeed against it. The measure of the damage occasioned by the fire is £50,000.

At a recent meeting of the Cromer Gas Company, Mr. Percy Griffith called attention to a circular issued to householders from the local electricity works, which he described as libellous and fantastic. It is both. The contractors, Edmundson's Electricity Corporation, Limited, and not the Resident Engineer and Manager (Mr. E. Hesketh), are responsible for the circular; but anyone who wants a hearty laugh should ask Mr. Hesketh to be generous enough to send him a copy for the purpose. The gas consumers who are the recipients of these circulars know that what is pictorially described is grossly false, and shows that humour and exaggeration are stronger points with some electrical people than business capacity and truth. The last meeting of the shareholders of the Edmundson Company is remembered. However, the sketches are headed "What our competitors offer." A gas-bracket is first depicted with an incandescent gas-burner, carrying a mantle that has the appearance of being rat-gnawed, and emitting volumes of smoke that would do credit to the shaft of an electricity generating-station in which the boiler fires have been badly stoked. Then there is a sketch of five bibulous looking customers, and alongside them an incandescent gas-burner with a long cloud of something represented as coming out of the top. Attached to this we have the statement, "Five men's breathing equals one gas-jet." The untruth is a libel on the incandescent gas-burner, and not on the men. There is also an inverted burner, with a young fellow placidly and studiously reading a book. Only the upper half of the student is shown; and we suppose the rest of his body and lower extremities have been scattered by the (what we take is the representation of an) explosion below. This portrayal of an explosion is remarkable. There is something in the centre that looks like the ordinary manner of depicting the sun; the rays being surrounded by smoke, and the sun's surface defaced by bricks. The sketches are accompanied by the common exaggerations as to all the virtues being on the side of electricity, and gas having lost all merit. What a pass electricity has come to, when it is considered necessary to canvass for business by such means as this! Since this paragraph was written, we find that a similar circular, with the same infamous sketches, has been issued by the Ilfracombe Electric Light and Power Company, of which the Engineers and Contractors are the Edmundson Company.

A prospectus has reached us issued by the Suffolk Electricity Supply Company, Limited, who are anxious to secure a few thousands more capital. We are not subscribers, and cannot advise "JOURNAL" readers to put money into the concern. The title of the Company is a big one, and suggests operations of a big character throughout the whole county. But on the contrary, the operations of the concern are in a little way. Stowmarket and Felixstowe in Suffolk are already receiving the attentions of the Company; and they have also gone outside the county to Diss. Now money is wanted to cultivate an electricity business at Woodbridge! There is a small circle of men in this rural town (whose judgment in matters electrical cannot be based on large experience) who would welcome the Company, and who would have welcomed it some months since if the money had been forthcoming on which business could have been established. We do not suggest there is anything queer about this concern; the only suggestion against any venture at Woodbridge is the shallowness of prospect through the limited possible custom for electricity and the bad name that the Company have earned on account of the repeated failure of the supply at Felixstowe. We see that Mr. Napier Prentice, who—unless there are more Napier Prentices about—seems to be Director, Engineer, and Secretary of the Company (and there is yet another Prentice whose name appears as one of the members of the firm of Solicitors to the Company),

took advantage of an opportunity of a 2½ per cent. advance in the street gas-lighting charge at Woodbridge last November to offer to light the streets by electricity at a price based on a seven years' contract. The Council, we believe, actually accepted the offer; and the arrangement should by now be in operation. But the Company when they tried to find money and customers came across an unexpected nakedness in the land in both respects; and so the always obliging Gas Company acceded to the request of the Council to light the streets for another year. This relief from a difficulty should be remembered to the credit of the Gas Company in future; but up to the present the Council have not shown any great appreciation. While they entertained the offer of a seven years' street-lighting contract from the Electricity Company, they would not consider good terms for seven years from the Gas Company. Of this we are fully satisfied, that if the public does respond to this appeal for funds to enter upon electricity business in Woodbridge, it will be found that, towards making the investment of the capital there profitable, the Directors of the Gas Company and their Manager (Mr. William Orme) will not contribute.

THE FRANCO-BRITISH EXHIBITION.

The Guarantee Fund for the Gas Engineering Section.

In the "Journal" for the 24th ult. (p. 758), we published the circular-letter addressed to the engineers of gas undertakings throughout the country, by Mr. H. E. Jones, the Chairman, and Mr. James W. Helps, the Hon. Secretary, of the Committee in charge of the arrangements for the Gas Engineering Section of the Franco-British Exhibition, asking them to lay before their Directors and Committees the claims of the section to financial support; and in the same issue we gave a list of the contributions to the guarantee fund, amounting to £3009 5s., which had been promised up to that time. We learn from Mr. Helps that since the issue of the circular the following additional sums have been promised:—

Companies.	£	s.	d.
European	50	0	0
L'Union des Gaz	50	0	0
Wolverhampton	25	0	0
Luton	21	0	0
Lowestoft	20	0	0
Ilford	10	10	0
Northampton	10	10	0
Preston	10	10	0
Tynemouth	10	10	0
Harrow and Stanmore	7	7	0
St. Albans	7	7	0
Aldershot	5	5	0
Barking	5	5	0
Douglas	5	5	0
Hitchin	5	5	0
Southend	5	5	0
Stretford	5	5	0
Winchester	5	5	0
Wakefield	3	3	0
Corporations.			
Leicester	52	10	0
Glasgow	50	0	0
Burton-on-Trent	10	0	0
Barrow-in-Furness	5	5	0
Devonport	5	5	0
Stafford	5	0	0
Stockton-on-Tees	5	0	0
Yeovil	2	2	0
	£397	14	0

The preceding promises, with those already notified, bring up the total to £3406 19s.

At the twenty-fourth annual meeting of the Society of Dyers and Colourists, held at the Technical College, Bradford, last Friday, the President (Professor R. Meldola, F.R.S.) delivered an address on "The Founding of the Coal-Tar Colour Industry." The first awards of the Perkin Medal were made to Professors Graebe and Liebermann, for their synthesis of alizarin.

An important discovery of natural gas is reported to have been recently made in Russia. The district is at Surachan, within a comparatively short distance of the Baku oil-field. While natural gas was known in Russia more than 1000 years ago, it is a remarkable fact that the prolific oil developments never yielded this commodity in sufficient quantity to be commercially valuable. All the operations in the field, such as drilling and pumping wells, &c., have been accomplished with the aid of the crude oil for fuel purposes. Now many firms are said to be changing over to natural gas for steam-raising; and special pipes are being laid for its conveyance and distribution.

A FRENCH TREATISE ON COAL GAS.

If one were asked to name the most general text-book on gas manufacture in use in various countries, would not Great Britain be represented by the "Handbook" of Newbigging, Germany by the volume of Schilling, Italy by the work of Calzavara, the United States (shall we say?) by Nisbet-Latta, and France by the treatise of Borias? Not that all, or any, of these are by any means comparable, but only that, to a certain extent, each in its way may be taken as representing some general view of each country's attitude in regard to its own gas industry. It might not be without interest, some time or another, to examine the gas literature of the different countries named, and to see what are their characteristics, and how some aspect of the particular genius of the people is exemplified.

The second edition of the last-named work—M. Edmond Borias' "Treatise of Gas Manufacture"—has just been published and lies before us.* It carries one back eighteen years, to 1890, the date of its first publication, and when it was a book from which the present writer acquired some knowledge of technical French. It was looked on then with some degree of awe, which has to an extent vanished; and a more critical and more open eye can be brought to bear upon the second edition of 1908. The "Treatise" has grown from about 500 to 600 pages; but it may be doubted if this represents the proportion of new matter, for typographical changes have been made, and many tables spread out, so that there is not that amount of fresh material that might have been expected, and which certainly the growth of the last eighteen years would have warranted. Let us look at the new matter first. There are two additional chapters; one on "Charging and Drawing Retorts" and the other (the last in the book) on "Various Gases." The former only runs to 21 pages of octavo size, which are hardly enough, even with a great amount of compression, to crowd in all the distinct types of machines now existing, in addition to inclined retorts and vertical settings. The information given is indeed scant and ill-proportioned. The machines of Mr. John West occupy a page; the Arrol-Foulis machines even less, being on a par with those of M. De Brouwer; while the little apparatus designed by M. Cabrier has double the amount of space allotted to it. Mention is also made of the mechanical devices of M. Boutan, the Compagnie Parisienne, and M. Vilain (or Villain, for it is spelt both ways within three lines); the last being a mere one-man hand-worked scoop for small gas-works.

The five pages on "Inclined Retorts" consist chiefly of the comparison recently made by Mr. J. G. Newbigging between the inclines of Gaythorn and the machines of Bradford Road, Manchester; between Mariendorf and Crefeld; and between figures given as far back as 1894 by the late Mr. Frank Livesey. On "Vertical Retorts," paragraphs are devoted to the Dessau system, the Bournemouth installation, and the Exeter plant. The last four pages of the chapter treat of the subject of mechanical conveying of coal and coke—figures of the late Mr. W. R. Chester being quoted. So much for one of the new chapters.

Water gas is dealt with in the only other additional chapter; the various processes of M. Tessié du Motay, Lowe, Humphreys and Glasgow, Strache, Dellwik-Fleischer, and Kramers and Aarts, being shortly described and some tabulated figures of costs, &c., given. Methane-hydrogen gas plants are noticed, together with enriching processes, oil gas, and that all-but-forgotten "portable" gas. There are, of course, fresh paragraphs added here and there throughout the book, and these will now be noticed as we glance through the volume.

The English custom—and we think it more natural—is to place all mathematical tables and formulæ at the end of a technical book such as this; but in this "Treatise" they are put right at the beginning, and occupy 88 pages. There are a few verbal changes and additions in them, but nothing of any moment. Then comes the "Second Part," beginning with a "Concise History of the Discovery of Gas Lighting," which, as its conciseness, at all events, cannot be controverted, we translate in full. It is as follows:—

The first known attempts at lighting by gas drawn from coal were made in 1669 by Saint-Hales [Does this mean Dr. Stephen Hales?], and recommenced by Watson in 1769. The results were insignificant, and they remained forgotten until the day when Philippe Lebon, the French engineer, invented his "Thermolamp" in 1786. About the same time, Murdoch, in England, endeavoured to make practical the idea of our compatriot, and began to light in 1792 the house where he lived. To Lebon belongs the glory and merit of having established the theory of his invention, and settled his true claim from its appearance. Murdoch and Winsor quickly popularized lighting by gas. The latter struggled against the prejudices which clung to this novelty in England and on the Continent, and succeeded in establishing the first known gas company, under the name of Winsor, Accum, and Hargreaves. Then Samuel Clegg appeared; and it may be said that from that day the new industry passed out of its infancy. He uninterruptedly endowed it with appliances and new processes, improved those that already existed, and simplified the manufacture. At his death a great way had been travelled towards the point which only left to his

* "Traité Théorique et Pratique de la Fabrication du Gaz et de Ses Divers Emplois, à l'Usage des Ingénieurs, Directeurs, et Constructeurs d'Usines à Gaz." By E. Borias. Second edition, by Edmond Borias and Marcel Fréchou. Paris and Liége: Librairie Polytechnique Ch. Béranger; 1908; [Price 25 fcs.]

successors the duty of pursuing the work so gloriously achieved, and of assuring its future.

As to this, we will only say that we are unaware of any evidence which fixes the year 1786 as the date of Lebon's "Thermolamp" invention; for he was then only nineteen, and had not yet been admitted to the Ecole des Ponts et Chaussées. We believe—whatever may be the hearsay as to what was done before—that the first patent of Lebon's which mentions the distillation of coal for lighting purposes is dated Sept. 28, 1799. But this is hardly the place to pursue this matter further at present.

The first chapter on "Coal" gives various analyses of it—particularly of five qualities used by the Compagnie Parisienne. Then are considered retort-settings and methods of heating. These are practically the same as in the earlier edition; and it is perhaps rather surprising that no new types of furnaces are given in the lists of fuel consumed and costs. To the chapters treating of the theoretical considerations of retort-heating are added a few practical notes on the lighting-up, repair, and letting-down of a bed. Passing on to condensation, a new paragraph is added on the naphthalene difficulty; it being stated that "if one takes care to reduce the gas in the works to the lowest temperature that it will reach in the mains, it is certain that further deposits of naphthalene need not be feared." With regard to chemical purification, there is additional matter in which the Foulis and Lewis processes of extracting cyanogen by washing the gas are mentioned; and the English practice of revivifying by air or oxygen is referred to. In fact, it is rather gratifying to note that, in the new matter that has had to be added to this French treatise on gas, in nearly every instance the names and work of English engineers figure conspicuously. This is shown by reference to the new chapter already mentioned on stoking machinery; and also in regard to vertical retorts, cyanogen recovery, and gasholder improvements.

Coming now to distribution, the high-pressure systems, chiefly in the United States, are not overlooked, and one or two installations in France are noticed. Prepayment meters are not described, but merely passed over in half-a-dozen lines. As to dry meters, it is said that "there seems to be a certain tendency shown in favour of introducing them into France. That would be interesting to watch, because, though they have drawbacks, it is undeniable that they offer certain valuable advantages, if only not requiring monthly levelling, which is often neglected or badly done in small towns." Incandescent burners have three additional pages allotted to them; it being stated that "in 1882, M. Servier presented to the members of the Société Technique du Gaz en France the first incandescent gas-burner, and then foresaw the revolution which this system was going to lead to in gas lighting methods." The incandescent mantle is then considered in some detail, and the causes of its brilliancy are investigated.

The chapter on the capital involved in gas undertakings has been extended by figures relating to Paris gas affairs.

Taken as a whole, of course, this second edition is more complete and even more useful than its predecessor. For it, both M. Edmond Borias and M. Marcel Fréchou are responsible. On its binding it is styled a "Traité Pratique de la Fabrication du Gaz," while on the title-page it is a "Traité Théorique et Pratique." We must confess that we find the "theory" largely outweighs the "practice" both in proportion and in value. It does not pretend to deal with construction; and as to manufacture, it is the chemical and theoretical aspects of it that are so largely and adequately presented. There are no illustrations at all, except three very slight outlines of testing burners and chimney. The index could with advantage have been considerably extended, if reference was desired to be facilitated.

Tar-Spraying Experiments in Westminster.

A large number of borough and county engineers were present on Monday last week at a demonstration given by the Tar Road Syndicate of their system of road construction. The piece of road selected for the experiment was a length of 600 feet on the north-east side of Vincent Square, Westminster, in front of the Horticultural Hall, where there is considerable traffic; and the surface had been roughly scarified previous to the demonstration. The machine tested consisted of a trailer to be drawn by an ordinary steam-tractor. The trailer contained a tank holding 400 gallons of tar, which was heated, to make it liquid, by coils steam-heated by the boiler of the tractor. Driven by chains from the back wheels of the trailer was a double-acting force-pump, which ejected the liquid tar upon the road through eight nozzles. These had each two outlets, set at an angle of 45° to each other, which caused the tar to be sprayed in an even fashion. The nozzles were at the back of the vehicle, like an ordinary water-cart, but had a shield over them back and front, so as to prevent the tar spraying elsewhere than on the surface of the road. About 5 feet of the road was covered with tar at one time; and it was explained that the tar permeates to the depth of 2 inches in unrolled roads, and is absorbed to a depth of an inch in the ordinary way—helping to bind together the forming materials. The pump forces the tar spray on to the surface at a pressure of about 60 lbs. to the square inch; and a gallon of tar is sufficient to cover thoroughly from 6 to 7 square yards of road surface. After the tar-sprayer had dealt with one side of the road, the grit-spraying machine, drawn by a single horse, followed, and covered the newly-tarred surface with finely-ground granite, which enabled it to be walked upon.

EXPORTS OF COAL IN 1907.

The larger business that was done last year, as compared with 1906, in the despatching of coal from this country to other places is shown by a Parliamentary Paper issued last week, dealing (for the two years) with the export of coal from all ports in the United Kingdom to all countries abroad, as well as the quantities sent from the principal districts of the United Kingdom to the chief groups of foreign countries, and also showing the amounts taken for the use of ships on foreign voyages.

The total exports to places abroad were 63,600,947 tons in 1907, and 55,599,771 tons in 1906. The increase last year was thus no less than 8,001,176 tons, which was divided over most of the groups of countries—seven showing an increase, and only three a decrease. By far the largest increase—4,744,467 tons (from 21,734,508 tons to 26,478,975 tons)—is to be found in the group including North Russia, Sweden, Norway, Denmark, and Germany. The other important group is the one including France, Spain, Portugal, Italy, South Russia, and Austria-Hungary; the figures being 27,114,100 tons in 1906 and 30,081,353 tons in 1907, or an increase of 2,967,253 tons. These two groups, it is thus seen, account for 7,611,720 tons out of the total growth of 8,001,176 tons. The decreases are shown under the heads of British South Africa; Ceylon, Straits Settlements, Hong Kong, Russian Ports on the Pacific, Australasia, &c.; and British North America, West Indies, Mexico, &c. Turning to the ports from which the coal was despatched, it is to be noted that Cardiff comes easily first with an export of 17,356,162 tons. The second is Newcastle and North and South Shields, with 11,284,479 tons; and the next in order are Newport 3,803,443 tons, Sunderland 3,259,422 tons, Swansea 2,895,550 tons, Methil 2,435,456 tons. The quantity of coal shipped for use on foreign voyages was approximately the same in the two years—18,590,213 tons in 1906, and 18,618,828 tons in 1907.

THE GAS CONSUMER AND HIS FRIENDS.

[From an American Correspondent.]

It is not to be expected that the action of the South Metropolitan Gas Company, in converting to safe fixtures, at their own expense, thousands of water-slide chandeliers the property of their consumers, will receive commendation from Progressives and people of that ilk, who can find no good in any corporate action except where "municipal" precedes "corporation." On the other hand, the host of workers, on both sides of the Atlantic, who are devoting all their energies to the problem of gas supply will recognize this gratuitous removal of a menace to the public safety as simply one of the many similar ways in which the public service corporations of the present day are meeting their obligation, and showing an appreciation of the benefit to be derived from expenses which do not bring in any direct pecuniary return. Considering gas companies and the field of house piping and fixtures, the average citizen in the United States has only himself to blame for any radical shortcomings in size or design of installations for (say) twenty years back. Our gas companies have consistently tried to obtain authority to inspect all house piping and fixtures, and to refuse a gas supply where the requirements would not be met. Such, however, has been the shortsightedness of the gas consumer and voter, as shown by his representatives in Municipal Legislatures, that in many cities to-day no provision exists by which either the city or the company are in a position to enforce gas-piping regulations, with the consequence that, under the pressure of competition, row after row of dwellings are erected with piping manifestly too small to supply the gas that the prospective tenants will desire to use for lighting, cooking, and heating, not in some future years, but at once, under the influence of a wide-awake commercial gas man.

Such is (unless changed within a year) the situation in Baltimore, with more than 500,000 inhabitants. Other cities, such as New York, entrust this work to the Municipal Government; and this is probably the tendency at present, due to the unreasoning suspicion of the gas company on the part of the citizen, which in so many ways affects adversely his true interests. Though better than no supervision, this municipal control of gas-piping involves, as compared with company control, greater expense, and decreased efficiency, resulting in time lost by gas-fitters while waiting for inspections, and more chance for corruption of inspectors to connive at bad work. Probably only a few cities are in the favourable position of Philadelphia, where the power to oversee gas-piping was always exercised by the municipal gas-works, and passed to the private lessees as part of the lease agreement ten years ago. The result has been that since that time nearly 100,000 houses have been inspected, and the piping in these houses is of proper material, well screwed together, and of such size that gas for any purpose, in any quantity needed for domestic uses, may be obtained from any outlet. Also, enough attention has been paid to the fixtures to bar-out flimsy material, or any design capable of developing dangerous leaks. This inspection work has been carried on with the least possible delay to the gas-fitter, and with practically no opposition on his part or on that of the gas-fixture manufacturer; and the expense, which may be estimated

at $50,000, is recouped in many indirect ways. One result has been that a Philadelphia citizen, when buying a house, need not trouble himself as to the character of its gas-piping and fixtures, beyond knowing that the builder possesses the required certificates of inspection. When one realizes that in a house selling for $1200 the extra cost in material and labour entailed by following a schedule of piping as required in Philadelphia, compared with the sizes actually installed by many builders in Baltimore, is not more than $2 per house, and that the failure to spend this sum means that if an attempt is made to use room-heaters the supply is so poor that neither is a proper light obtained nor does the heater warm the room so quickly as it should, the penalty paid by ignorance is glaringly shown.

So much for house-piping possibilities and failures. Another point where the gas consumer fails to recognize his true interests is in connection with the testing of gas-meters. Though the cases where gas companies set meters known to be fast are undoubtedly rare, and not to be compared with the lapses from honesty occasionally found in all lines of business, yet in America at least there is a widespread prejudice against the gas-meter. This feeling probably arose entirely from the old-time policy of the companies in regard to complaints of overcharge. The policy was one of no explanation, and gave the consumer the choice of paying his bill or doing without gas. Though the policy is changed, and to-day many hard-working gas clerks spend their whole day patiently listening to explanation and often abuse, and in this and other ways the company does everything to show the consumer that the bill he is asked to pay is a just one, yet the feeling is hard to remove, and shows itself in almost all legislation looking towards control of gas companies. In entire ignorance of the fact that the old-time policy of indifference to complaints was usually accompanied by a failure to pay proper attention to meter repairs (so that when consumers were receiving scant courtesy at the office they were yet, as a whole, enjoying slow meters), the American thinks that one of the advantages of control of gas companies will be to ensure the correctness of all gas-meters when set, and a correct test of the meter whenever a complaint is made as to the bill. Therefore, we have for many years spent, either through City or State channels, an amount of money very large in the aggregate to pay for meter inspectors, who would certify to the correctness of all new or repaired meters, and make tests of meters on complaint by consumers.

The inspection of meters before setting has almost always been a farce. The inspector sent official seals [?] by hundreds to the various meter companies; and the net result was that the companies set correct meters as they had always done, while the consumer, either as a taxpayer or as a consumer, paid for a protection which did not protect and never was needed! Now, under the Public Utilities Commissions in New York, the testing of meters is no longer a farce, but the attendant expense has greatly increased; and it is very much to be hoped that not only in New York but in Wisconsin, and in any other States that may establish Commissions, the latter will soon acquire sufficient knowledge to appreciate that any expense incurred in testing new or repaired meters prior to being put into use is unjustifiable, and that with this knowledge will come political courage necessary to act upon it, and to inform the public that such testing is a mistake.

The other class of public meter testing—viz., on the complaint of a consumer—involves so little expense, especially when, as is usually the case, accompanied by the payment of a fee, only refunded if the meter shows fast, that it may well continue until the public have learned, at the cost of many fees, how accurate a gas-meter is, and also, after some more years' experience with progressive gas companies, how fair the latter are. Thus we return to our starting point, and end with the statement that the gas consumer's best friend is his gas company, and low prices for gas will be soonest reached when consumers appreciate this, and put an end to expensive official interference with the gas business.

The Midland Junior Gas Engineering Association will on Saturday next, at the invitation of Mr. J. Ferguson Bell, M.Inst.C.E., the Engineer and Manager, visit the Litchurch and Cavendish Street Gas-Works, Derby. The Litchurch works will be inspected first, after which conveyances will be in attendance to take members to the town, where they will be entertained at tea by Mr. Bell. The visit will then be paid to the Cavendish Street works. There should be a good muster of members—especially in view of the fact that Derby is the town of the President of the Association (Mr. W. E. Caton).

Lights and Lighting at the Forthcoming Municipal Exhibition.—Our readers may remember that arrangements have been made for holding the first Municipal Exhibition at the Royal Agricultural Hall, from the 1st to the 12th prox. We learn from the Organizing Managers (Messrs. Smith and Bridges) that during the exhibition some demonstrations are to be given, under the direction of Mr. Leon Gaster, the Editor of "The Illuminating Engineer," of the methods in use for the measurement of the lighting power of the different illuminants now employed; a number of photometers in use in this country and abroad being lent for the purpose. This should excite a considerable amount of interest among municipal officials, in view of the discussions taking place from time to time in regard to the respective merits of different kinds of illumination. One or two papers will also be read on the subject, as well as on lighting and water supply.

FUEL AND ITS FUTURE.

Gaseous Fuel and the Production of Power.

At the Royal Society of Arts, on Monday last week, Professor Vivian B. Lewes, F.I.C., F.C.S., delivered the last of his course of Cantor Lectures on the subject of "Fuel and its Future," in which he dealt principally with gaseous fuel and the materials for its production.

Professor Lewes began by pointing out that, as he had shown in a previous lecture, when gasifying bituminous coal it is possible to obtain as much as 80 per cent. of the heat present in the solid fuel in the producer gas made from it, and that in practical working from 40 to 50 per cent. of this can be utilized for heating purposes; while when we come to consider the generation of power we find that the internal-combustion engine offers such further economies that it is not surprising that on the Continent the use of steam is being rapidly superseded. He went on to say that the history of the gas and oil engine is one which is rich in the triumphs of perseverance and engineering skill; and those who knew the early forms of the Otto and Langen gas-engine find it difficult to realize that it can have been the progenitor of the modern magnificent examples of engineering skill which are capable of developing up to 2000 H.P. In the early forms of the gas-engine, which rarely exceeded 3 H.P., coal gas was the only fuel used; and although Mr. Siemens had experimented with it, it had never crossed the mind of any other experimentalist that it would be possible to replace the product of the distillation of coal, having a heating value of upwards of 600 B.Th.U. per cubic foot, by gas so low in thermal value as the producer gas or semi-water gas which has worked such a revolution in heating. When, however, in 1879, Mr. Emerson Dowson showed that the gas now generally known by his name could be satisfactorily employed, modifications at once began to be introduced which eventually led to the present type of engine, with high compression of the charge and improvements which have resulted in efficiencies of from 26 to 32 per cent.

At the present time, the fuel developments of the last decade have settled down into the production of power gas for large works by plants of the Mond type; while when the motive force needed amounts to only a few hundred horse power, suction-gas plant is employed. The inception of this form of plant dates back only to the year 1894, when Bénier fitted a suction pump to the side of his engine cylinder, and drove it off the fly-wheel, drawing the gas from the generator, and compressing it into the engine cylinder—leaving a lowering of pressure in the generator to suck air and water vapour into the fuel, and so keeping up the supply of gas. Very shortly after this, Messrs. Pintsch brought out a complete plant, in which the steam for the generator was produced by the hot gas from the producer in a small tubular boiler, which was thus made to perform the dual function of cooling the gas and giving the necessary steam, which as it was formed was drawn with air into the grate of the generator and passed through the fuel. After this partial cooling, the gas was passed through a scrubber and purifier, and then on to the combustion chamber of the engine. Since then many forms of suction plant have been introduced, of which those of Dowson and Crossley may be taken as types; and though much yet remains to be done, Professor Lewes thought it clear that this plant would shortly become as universal in England as it is on the Continent.

There are, however, drawbacks to suction plant; and these the lecturer proceeded to point out. They are that, in starting, the generator has to be raised to the right temperature by means of a hand blower or steam injector; that the engine has to be started either by hand or by compressed air; and that, where space is at all limited, the fuel used is practically restricted to anthracite or coke, as any bituminous coal gives rise to tar vapour, the difficulty of eliminating which from a gently flowing stream of gas necessitates the use of somewhat bulky washers and condensers—the cleanliness of the gas being an absolute essential, as the smallest trace of tar causes sticking of the valves, and brings the engine to a stand. The advantages, on the other hand, are so great as to make up for these troubles. Among them the wonderful elasticity which in a few minutes enables the generator to be working satisfactorily, from a low to a high yield, or *vice versâ*, and the smallness of the stand-by loss when the plant is not doing work, are those which appeal most to manufacturers; while the economy of fuel is great—the average consumption being 1 lb. of anthracite per brake-horse-power.

What, in the opinion of Professor Lewes, is now needed to complete the success of the suction plant is a generator for a small-sized plant which will be available for use with bituminous slack, so as to rid the manufacturer of dependence upon the costly anthracite; and it is in this direction that a large amount of work is being done at the present time. The factors which make this a problem of the greatest difficulty are two—first, the elimination of the tar produced; and, secondly, the fact that, though a non-caking coal can be used, directly a caking variety is employed the fuel swells and forms an arch on the top of the generator, below which are produced cavities, clinker, and other causes of trouble, which at once interfere with that uniformity in the composition of the gas which is essential to smooth working of the engine. The latter trouble can be surmounted for a time by the selection of the coal, though this eventually would narrow

down the market and increase its price; but tar offers a problem which will be extremely difficult to solve.

Those who have had experience of the trouble of ridding coal gas from tar-mist will be acquainted with the difficulties that have to be met. Professor Lewes's opinion is that in the long run the same solution will be found of this problem as of that relating to smoke—viz., that the fuel for the small suction generator will be prepared in the gas-works by low-temperature carbonization, and that it will be found that the resulting coke is specially fitted for this work, giving a bright combustion under the lowest possible load, and so small a trace of tar that it can easily be dealt with; while for works capable of utilizing the heat and power from the gasifying of anything near 100 tons of slack a day, improved Mond generators and plant fitted for ammonia recovery effect such enormous economies that, even with only 1 per cent. of nitrogen in the slack used, the sulphate of ammonia obtained practically pays for the fuel.

Passing on to the subject of internal-combustion engines, Professor Lewes dealt first with those using liquid, and afterwards with those utilizing gaseous, fuel. He explained that when considering the economies realized by these engines, it was necessary, by way of comparison, to take into account the amount of fuel consumed in developing power by means of steam; and he proceeded to show that, taking the average consumption of coal throughout the country, 5 lbs. per horse-power-hour would be a low estimate. He then called attention to the following figures, giving the cost for the generation of 1 B.H.P. hour by the different systems named:—

	Efficiency.	Fuel Consumption per B.H.P. Hour.	Cost in Pence per B.H.P. Hour.
Coal—Steam-engine	8·6	2·00 lbs.	0·20
,, Turbine	12·0	1·70 ,,	0·17
Oil—Diesel engine	32·0	0·40 ,,	0·20
,, Crossley ,,	22·0	0·60 ,,	0·30
Petrol	22·0	0·55 ,,	0·94
Coal gas	31·0	16 cub. ft.*	0·30
Power gas	31·0	80 cub. ft.*	0·10

* Better expressed as 8200 B.Th.U.

The lecturer remarked that the figures showed that, under anything but ideal conditions, it would be quite easy to reduce the consumption of fuel to one-fourth for the same output of power as is being used to-day. As the consumption of coal for power purposes amounts to 52 million tons per annum, this would mean a saving of 39 million tons a year. The production of coal gas and the coal used for domestic fuel amounts to another 50 million tons, of which certainly 10 millions could be saved by the treatment of the bituminous coal at the gas-works and the utilization of the gas and low-temperature coke for domestic purposes in place of coal; while the products from the tar would effect other economies, by providing large supplies of motor spirit and fuel oil.

Professor Lewes went on to emphasize the point that, in considering the methods which can be employed to prolong our coal supplies, not only must the question of economy in use be borne in mind, but also how far it is possible to replace coal by other materials for the generation of heat and power. He had in his first lecture explained that peat—the intermediate product of the decomposition of vegetable fibre undergoing conversion into coal—is a fuel of considerable value, and is almost as widely distributed as coal itself. But its use as fuel has been restricted to countries in which there has been little or no coal; and in Ireland, Scotland, and many Continental districts, the air-dried sods of peat, piled at the backs of the villagers' cottages, have for centuries been their chief fuel supply. The trouble which has always militated against the use of peat as fuel is that, being of an excessively spongy nature, it contains an enormous amount of water—it being not at all unusual to find at the bottom of the bog from 80 to 90 per cent. of moisture in it; while even the top layers will contain from 79 to more than 80 per cent. The difficulty has always been to find a method by which this large quantity of water could be taken out so cheaply as to make the peat a fuel of sufficient value to compete with other solid fuels. Air-drying has been the only available method; but this necessitates a good deal of handling of material, space, and time. On the Continent and in Canada, it has been found economically possible, by air-drying the peat down to the lowest attainable point and then briquetting it, to form a fuel which will well hold its own against the brown coal briquettes largely employed abroad. In Great Britain there exist more than 6,000,000 acres of peat bog, about 2,373,300 acres of which are in Ireland; while even in England there is a very large acreage, in some cases in counties where the climatic conditions would be as valuable for air-drying to a workable degree as those found on the Continent.

Peat, like slack, practically always contains a certain amount of nitrogen, which can be extracted from it as ammonia under the same conditions. In some cases the nitrogen in the peat exists in much greater quantities—some samples having as much as 3 per cent., while in other bogs it may be less than 1 per cent. It has been shown by Rigby, Frank, Caro, and others that directly the nitrogen gets above 1 per cent., a profitable business is to be done by gasifying the peat in a Mond producer of modified construction. Producers made by Crossley Bros. answer excellently for the purpose, and differ from the complicated original Mond plant by containing only one tower and one set of pumps in place of the three towers in the old form of plant. By this process it is possible to use a liquor with only 0·5 per cent. of free sulphuric acid for the absorption of the ammonia, in place of the 3 to 4 per cent. used with the old chequer-work tower. In such a plant, the peat burns perfectly well while still containing 50 to 60 per cent. of moisture—a degree of dryness which can be arrived at in most places by a short period of air-drying.

With some samples of peat analyzed by Professor Lewes, containing a little more than 2 per cent. of nitrogen, it was possible, he said, to obtain as much as 134 lbs. of sulphate of ammonia per ton of dry peat gasified; and as it could be used with 50 per cent. of moisture still in it, the cost was reduced to a minimum. A ton of sulphate could be made at an expenditure of about £5 10s. Consequently, as the selling price was £11 10s., it left a large margin for profit; and the demand being unlimited, the price was not likely to fall below this point. One ton of sulphate of ammonia could be obtained from between 16 and 17 tons of dry peat. According to the lecturer, the power gas produced during this operation is quite as valuable as that made from slack in the nitrogen-recovery plant; and the dry peat would yield about 80,000 cubic feet of gas per ton, though with a peat containing 50 per cent. of moisture the yield would, of course, be proportionately less. Where nitrogenous peat of this character exists near to railway accommodation, Professor Lewes said it would constitute a valuable centre of industry, as the power produced from the gas could be sold for far less than water power at Niagara.

Coming to the other sources for the production of power, the lecturer pointed out that it is useless to rely on oil as a fuel to replace coal, as not only are the supplies at present totally insufficient to do more than enable us to use oil for purposes for which its ease of application specially fits it, but we are further confronted by the fact that oil will probably have ceased to be available some time before our coal supplies are exhausted. As to water power, the amount which could be utilized in this country is extremely small. Though Scotland and Ireland are not so badly off in this respect as England, yet the quantity that could be safely reckoned upon would, according to estimates, be only equal to 1,200,000 tons of coal per annum; while such sources of power as the tides and winds are so costly to "harness" as to make their use almost prohibitive. In the fuelless future, therefore, the world, in Professor Lewes's opinion, will probably have again to return to vegetation for a solution of the trouble.

Although holding the opinion just enunciated, the lecturer acknowledged that existing conditions would render impossible the conversion of vegetation into any of the forms of fuel to which we are accustomed, as, apart from the fact that the vegetation which formed our coal measures grew under entirely abnormal conditions, the conversion of the cellulose into peat, lignite, and coal is an operation that requires a combination of time, temperature, and pressure impossible now to attain. After careful consideration of every possible method by which growing vegetation could be rapidly converted into available fuel for the generation of heat, we are forced to the conclusion that fermentation will be the only practical solution of the problem; and though grain contains a larger proportion of starch than potatoes, the latter will always be the more economical source of alcohol for fuel, as the crop given per acre is much larger.

If we are to judge a fuel entirely by its calorific value, alcohol would prove itself, as Professor Lewes pointed out, but a poor substitute for the hydrocarbons derived from shale or petroleum. But, as he has shown in the course of his lectures, there is a factor more important than calorific value, and that is the ease with which calories can be converted into work; and he thought the use of alcohol and petrol respectively in the internal-combustion engine is as good an example of this as could be cited. Experiments were made in Vienna, at the time of the last Exhibition there, upon two 8 H.P. engines, one designed for petrol and the other for alcohol; and the following results per B.H.P. hour were obtained: Petrol, 340 grammes; alcohol, 373·5 grammes—the efficiency calculated for the petrol being 16·5 per cent., and for the alcohol 28 per cent. M. Cheveau, working with a 16 H.P. motor running at 1800 revolutions per minute, obtained with alcohol an efficiency of 38 per cent. The lecturer remarked that if a large alcohol industry were to become a necessity, as it undoubtedly will in the far future, large areas in England and Ireland, at present unremunerative, would be put under cultivation for potatoes; and while the pick of the crop was marketed, the remainder would be fermented. Under proper conditions, the price of potatoes for this purpose could, he said, be reduced to 20s. a ton, and even at that price bring prosperity to many districts now in the depths of poverty. In Ireland, potatoes cost in a good season 35s. to 45s. per ton wholesale.

When concluding his lecture, Professor Lewes said: In these lectures I have attempted to show the pressing necessity for at once facing the fact that, as far as fuel is concerned, we are living on our capital, and squandering it in a way which not only ruins our atmosphere, but will shortly bring us face to face with a condition of things which will render it impossible for us to hold our position in the world. I have also tried to make it clear that, though it would be madness to do anything that would hamper our commerce, yet it is quite easy, by adopting economies of the simplest kind, to prolong the period during which it will be possible to obtain coal at a usable price. If these four lectures have helped in any way to attract attention to this all-important question, they will have justified the attempt to crowd an infinite amount of matter into four short hours.

At the close of the lecture, a hearty vote of thanks was accorded to Professor Lewes, which he briefly acknowledged.

INFORMAL MEETING OF SCOTTISH GAS MANAGERS.

Annual Meeting in Glasgow.

The Twenty-Fifth Annual "Informal Meeting" of Scottish Gas Managers was held in the Grand Hotel, Charing Cross, Glasgow, on Wednesday last. The meeting was the largest which has ever been held under the same auspices. Mr. G. R. HISLOP, F.C.S., of Paisley, was President.

Mr. W. B. M'LUSKY (Perth), the Convener of the meeting, intimated that he had had communications from official bodies, including the Institution of Gas Engineers, expressing the hope that they would have a successful meeting.

PRESIDENT'S ADDRESS.

The PRESIDENT then delivered his address, in which he said:

Gentlemen,—My first words to you must necessarily be those of congratulation upon your attaining the semi-jubilee, or twenty-fifth anniversary, of your informal meetings; and I have to thank you for having so generously conferred upon me the honour of asking me to preside upon this important occasion. I appear before you, however, impressed with the sentiment of the preacher in Ecclesiastes, that "there is no new thing under the sun." And, if that be a truism, you will, as a matter of course, justify any failure on my part to present to you something that is not, to some extent at least, known to you and others in the gas profession. Need I here say, however, that there is one thing which, in a sense, comes to us as new, and sometimes with startling suddenness, and that is the claims of death and the grave on our friends and associates. We have to-day to lament the loss of three from our ranks during the past year. Mr. T. D. Hall, of Montrose, was a gentleman well known and much respected; we lament also the death of Mr. John King, of Bo'ness, and of Mr. George Taylor, of Jedburgh. All have passed the bourn whence no traveller returns.

In further addressing you, I purpose confining myself to reference to a few only of the problems involved in our business, which have of late been the subjects of discussion, and such as I consider not only well worthy of consideration but of everyday practice, and leaving out, as unnecessary, reference to innumerable other subjects which have already been discussed and rediscussed by the numerous Gas Associations now existing over the country.

The phenomenal advance on the price of coal, in the absence of any disturbing element in its production, has taken the British coal consumers completely by surprise, and wrecked the gas managers' ideals and aims towards a cheapened production of gas, alike suitable for lighting, power, and heating. The removal of the 1s. tax is by some alleged as the cause of the advance. But this is not all the truth, since it is well known that the foreign demand was excessive even at 4s. to 5s. per ton in advance of former prices. Consequently, the demand for British coal existed quite independently of the 1s. tax. But surely some check should be put upon this unwarrantable drainage of the nation's wealth—a valuable national asset which, if parted with, can never be replaced, and would, at no very remote period, spell disaster to our commercial life. If the foreigner will have our coal, let him "pay tribute to Cæsar" for it. I find that in 1842 Sir Robert Peel imposed a duty of 4s. per ton upon all coal taken out of this country by foreign vessels, and 2s. per ton if by British vessels. But this was repealed two years later. The re-imposition of a similar tax is most urgently called for—of (say) 3s. per ton by foreign vessels, and 2s. or 2s. 6d. per ton by British vessels. The result would be a gain of between £5,000,000 and £6,000,000 a year to the Exchequer, and would permit of a substantial reduction of the income-tax. It is some satisfaction meantime to find that the price of coal has receded to a figure under that of a year ago; but, unless consequent upon a reduction of miners' wages, we shall not again see coal near former prices. However, if the absurd Miners' Eight-Hours Bill becomes law, it will certainly have the effect of raising the price all round.

While the destructive distillation of coal in retorts is the apparently simple premise upon which every gas manager sets out, it is unnecessary to say that the conclusions arrived at are at once immensely varied and not a little conflicting. The economic handling of coal and coke, and the maximum production of gas per ton, without undue reduction of the lighting and thermal value, are the ideal results upon which the inventive faculties of the leading gas engineers are exercised at the present moment; and it is to such as have the courage of their own convictions, will power, and self-reliance, that we have, as in the past, to look to in the future for those advances in science and manufacturing economics which now and again startle us and come as "boons and blessings."

Though a great advance has been made in the scientific and economical production of gas in recent years, it is evident that we are upon the threshold of other important developments. But whether the vertical retort system, with a continuous feed of coal and a corresponding discharge of coke, or the coke-oven system now worked so successfully in America, will win the day, time alone will determine. The system of continuous feed, or feed at short intervals, in which the coke is synchronically discharged at the lower end, is no doubt an attractive one; but there are difficulties to encounter that require careful consideration and study. It is, for instance, a nice point to determine at what part of the retort the gas should be taken off, so as, on the one hand, to avoid undue contact with the hot coke, and the consequent decomposition of the gas; and, on the other, to avoid its removal too near the charging end, without being subjected to the heat necessary to crack-up into permanent form the more condensable vapours in the gas. The problem of how to get a satisfactory continuous discharge of coke from the lower end of such retorts has, I believe, been solved. This is an important advance, since to drop the hot coke into a water-seal would over-saturate it; and while the decomposition of so much steam would increase the yield of ammonia, there would be produced also a corresponding volume of blue water gas, and consequent lowering of the candle power.

The M'Gilchrist Memorial.

Facsimile of Sketch approved for the President's Medallion.

[See p. 27.]

To be made by David Macgregor and Co., of Perth.

The two vertical systems which are at present receiving attention are the Woodall-Duckham and the Dessau, of Germany. Mr. G. R. Love, of Guildford, comes well to the front as a competitor with his 45° angle-set retort, which is practically a vertical retort, in the sense that it is entirely filled with coal. Unquestionably the system is one of great promise.* Another phase of the question of economical gas production has been announced by Mr. Westcott, of the Economical Gas Apparatus Construction Company, which was illustrated in the "JOURNAL OF GAS LIGHTING" for the 4th of February (p. 284). In his patented system, he proposes to make coal gas and water gas simultaneously, and so convert the entire carbonaceous and heat-producing content of the coal into gas—this amounting to 45,750 cubic feet per ton, of 6·65-candle power and 407 B.Th.U. per cubic foot. It is further stated that, as the result of practical working, one ton of coal distilled in ordinary retorts, and the coke from same converted into blue water gas, gives 13,998,400 B.Th.U.; whereas it is estimated that the product from one ton of the same coal under this system equals 16,832,320 B.Th.U., or a gain of 2,833,920 B.Th.U., or 20·25 per cent.—partly due, no doubt, to the heat lost in cooling the coke on the ordinary plan. The system entails, of course, enrichment of the gas from 6·65-candle power to the required extent by means of oil, though it is not stated how this is to be done. Presumably it must either be effected by passing the gas through a complementary carburetting apparatus, or by oil gas produced on the Young principle and added to the lean gas. But it must be borne in mind that oil gas must not be mixed with coal gas, however low its illuminating power, without first washing the former in its own oil, since the condensable vapour thus removed from the oil gas possesses the property of completely absorbing the illuminating constituents of the coal gas. This property of paraffin oil, it may be interesting to note by the way, was first discovered by the late Mr. John Young, of Dalkeith, over

* See "JOURNAL," Vol. XCVI., p. 530.

thirty years ago, when experimenting on behalf of the Committee of the North British Association of Gas Managers, of which I was a member, to find a substitute for water in wet gas-meters. The discovery was given to the world, and, needless to say, it has saved millions of money to the oil-producing industries; for, instead of illuminating the heavens, and miles of country around every oil-works, the residual gas, amounting as it did to between 1200 and 1500 cubic feet per ton of shale distilled, is simply washed with oil to absorb the hydrocarbon vapours and produce a valuable light oil, or gasolene.

Notwithstanding all the efforts now made to revolutionize the present method of carbonizing coal, it will require a generation to supplant existing systems; they will be ill to beat. Modern charging machinery has given new life and a charm to the horizontal retort system that will long be sustained. The question of temperature in the distillation of coal is about as critical as the fractionation of the distillate from coal tar itself, since every coal, especially of the richer class, according to its composition, requires its own appropriate temperature for economic distillation; and the best index, perhaps, to such temperature is the volume and density of the tar produced. Defective temperature and the varying proportions of water in coals, are accountable for the difference experienced between the experimental and the more practical scales of distillation. The importance of determinating the percentage of water in all coal under test cannot be overlooked, in order to secure reliable comparative results.

My practice is to test all coals with a content of water equal to two-thirds of their total water-holding capacity; and without some such basis it would be impossible to get anything like corresponding results from the same coal if tested at different times, or to compare one coal with another. Various methods have been detailed in the pages of the Technical Press and elsewhere for arriving at the comparative value of gas coals; but many of these are at once intricate and misleading. By some, the cost not only of manufacture, but of distribution, are taken as a basis of valuation, which is entirely unnecessary. What more can be desired than taking the cost of manufacture at so much per ton, and comparing all coals with an adopted standard? If, for example, you select any well-known coal as a standard with which to compare other coals from year to year (as I have taken main Lesmahagow cannel coal for the past forty years, though now extinct), say your standard coal yields 11,000 cubic feet per ton of 21-candle gas, and is therefore equal to 792 lbs. sperm value, then—

	s.	d.
Value of standard coal (say)	7	6
Add value of coke (combustible matter only)	6	0
,, ,, tar and liquor per ton of coal (say)	2	8
	16	2
Less cost of purification by lime	0	8
Value of standard taken as 100, and say	15	6

Then supposing that the relative value of another coal is wanted, and it yields 10,000 cubic feet of 20-candle gas, this will equal 685·71 lbs. sperm value.

Hence, 792 : 685·71 :: 7s. 6d. : 6s. 5·93d. Then—

	d.	s.	d.
Relative value of coal under test (as above)		6	5·93
As the standard coal yields 11,000 cubic feet, and the coal under test 10,000 cubic feet, and taking the cost in wages per ton on the 11,000 cubic feet basis at 2s. 3d., it will be found that the loss in wages due to the 1000 cubic feet reduced production is	2·45		
The foul gas, before entering the purifier, is found to contain an average of H_2S 1·25 + CO_2 2·50 = 3·75 per cent., and assuming the cost of purification by lime alone to be 0·2d. for each per cent. of the combined impurities per 1000 cubic feet of purified gas, we have 3·75 × 0·2d. × 10 =	7·50		
Wear and tear of retorts due to 1000 cubic feet reduced make (say)	0·50		
		0	10·45
Net value of the gaseous product		5	7·48
Coke produced, (say) 12 cwt., at (say) 6d.	72·00		
Less ash in coke = 6 per cent., taking the zero limit of value at (say) 30 per cent. then $\frac{6}{30} \times 72$ (as above)	14·40		
Net value of coke	57·60		
Tar, 12 gallons of 11 lbs. per gallon, and (say) 16s. per ton	11·31		
Liquor, 35 gallons of 4° T., at 4s. 9d. per 100 gallons	19·95		
		7	4·86
Net relative value of coal under test		13	0·34
Net value of adopted standard		15	6·00
Difference, or *minus* value of coal under test		2	5·66

Hence, 15s. 6d. : 13s. 0·34d. :: 100 : 84·05 per cent. of standard.

I do not agree with the method of those who alter the value of the standard (if they have one), and relatively also the value of the products from all other coals according to their market value year by year. The standard coal, and the value attached to it, should be adhered to all through, and the tendered price of all coals being set against the ascertained value on the basis of the standard, the *plus* and *minus* difference will be shown at once. The greatest *plus* differences will, of course, directly indicate the cheapest coals.

To give an example, supposing three coals, including the standard coal, are offered (say) from A, B, and C, we have—

	Price per Ton Delivered into Works.	Value in Relation to Standard = 15s. 6d.	Difference between Value and Contract Price.
	s. d.	s. d.	d.
A	12 8	13 0·34	+ 4·34
B	13 6	12 11·25	− 6·75
C (standard)	15 0	15 6·00	+ 6·00

It will thus be observed that the relative value of each coal in relation to the standard, is found. Indeed, this is all that is really wanted, and not the value of the coal on the basis of the fluctuating market value of its products.

If I may be allowed a slight digression, I should here remark that, upon a like principle, tenders for all goods and plant should be similarly treated. One kind of apparatus or plant may require more attendant labour, supervision, and maintenance than another, which, if duly allowed for, would in many cases completely reverse the face-value of a tender. Thus, supposing a firm submits a tender for a section of gas-works plant, and it is found to be £250 lower than that of a competitor offering a rather different plant for fulfilling the same function, it may be found that the position is entirely reversed when the tenders have received due consideration. An economy in working the higher-priced plant, amounting to the apparently small sum of 1s. 6d. per day, gives £27 7s. 6d. per annum. This capitalized at 5 per cent. represents a capital sum of £547 10s., which should be placed to the credit of the higher tender or added to the lower one; and thus the tender which appeared to be £250 less would in reality be £297 10s. higher than the apparently excessive one. This principle of dealing with tenders must commend itself to every fair-minded man; and it is but fair to contractors.

I now pass on to refer shortly to the question of condensation and purification. The word "condensation" is a comprehensive one, and a vital one withal to the gas manufacturer, since out of it much good or evil is evolved. Upon its careful and judicious control depends the retention of the lighter tarry vapours up to a point at which they are made serviceable not only in maintaining the candle power of the gas, but in eliminating the objectionable naphthalene which burdens the heart and well-nigh defies the energy and the skill of gas engineers to overcome. The tension of naphthalene vapour being greatly influenced by temperature, I have long maintained that the naphthalene troubles have been largely self-imposed—no doubt unwittingly—by neglect of the influences contributing to its production, such as the irregular charging of retorts and prolonged high heating of the contents at the thinner parts, producing not only an undue proportion of naphthalene but of carbon bisulphide, and also allowing the temperature of the gas to fall below 65° Fahr. before reaching the scrubbers and 60° Fahr. at the purifiers. Therefore—to some extent confirming the opinion I have held—Mr. Ferguson Bell, of Derby, in the first step of his process, washes the hot gas in hot tar; thus showing the importance of maintaining the temperature of the gas with its tarry and naphthalene vapours up to the scrubbers, where both are condensed and with a reducing effect upon the naphthalene. But the modern tar-extractor, in which the gas is screened at a temperature of from 70° to 75° Fahr., is practically a washing process. Mr. Bell, however, effects a further reduction of the naphthalene by washing with heavy naphtha, in the proportion of 0·2 gallon per ton of coal, and at a cost of 0·74d. per ton of coal carbonized.

With regard to purification by lime and oxide of iron, the methods generally employed are, in my opinion, at once wrong in principle and costly and troublesome in working; and it is interesting to notice the devices that are being tried to secure an object which anyone may attain at little cost. It is now exactly thirty years since I adopted the system I have continued to follow ever since. In 1878, I constructed four purifiers, 36 ft. by 30 ft., and, by the way, I should say of concrete, excepting the water-lutes and the covers, which were probably the first of their kind. These I arranged to work upon a principle exactly the reverse of what then existed, or is even now in practice—viz., that of passing the gas down through the purifying material in each box, instead of up through it; and if experience gained by close observation over an extended period be reckoned at its worth, you may accept my statement that the system possesses unmistakable advantages. It is a fact within the experience of every gas engineer and manager that, in the use of lime especially, the foul gas in entering the trays at the bottom must at once pass through the narrow slits of the grids, and the lime over these speedily becomes carbonated, and so offers serious resistance to the passage of the gas. This frequently places a manager in a very awkward plight, intensified by the objectionable rotating centre-valve system, since nothing short of emptying the offending purifier will really suffice to cure the mischief.

The trouble not unfrequently arises when the contents of the purifier are far from being spent; indeed, some of the most trying experiences of my earlier life were due to such circumstances. Simply reverse the passage of the gas—taking it down through the material in every case—and you effect a revolution. High pressure due to resistance will rarely ever be experienced, since the gas enters over the entire area of the purifier; but should any tendency to high resistance ever occur, 10 to 15 minutes would suffice to lift the cover, chop up the surface, and put it down again, and you have equal to a fresh purifier. Another aspect of this question is the number of trays employed in each purifier. In my case, I have, since 1878, used one only, and that, of course,

at the bottom of each purifier, and have filled the purifiers up to near the top, or with from 40 to 44 inches of lime or oxide, as the case may be. I employ both. The resistance or back-pressure ranges between half-an-inch and an inch per purifier, while passing gas at the rate of 2½ million cubic feet per day. The material is uniformly and perfectly spent. The only thing requiring to be observed is that the materials be filled in uniformly and without undue packing at any part, unless all round against the sides, where moderate ramming is necessary.

I reckon the cost of changing a purifier having (say) three sets of trays, two of which have to be taken out and returned, to be quite 50 per cent. more than the cost of the single-tray system. Moreover, the theory that gas requires to equalize itself before passing through each successive tray is of little value; and I consider the intervals between the trays a source of danger, since at a particular stage in the process of cleaning—viz., when the layer upon a tray has just been pierced, and air admitted—a spark produced by a pick or a shovel striking a piece of flint, in the case of lime, may ignite the mixture, as occurred in a works a number of years ago, with unfortunate results.

I was very pleased to find, from the interesting discussion by the Dutch Gas Engineers, that they are in practical agreement with my method of working. Mr. Mertz defines the matter very clearly when he states "that he had come to the conclusion, on the basis of practical tests, that the crude gas should go down through the oxide (with which alone he was dealing), and that the working of the purifier boxes is independent of their ground area and of their form; that shallow purifiers are most unfavourable, as furnishing a small capacity for their ground area; and that deep boxes should be used instead of shallow." In general, therefore, the points to be kept in view are: (1) Large area and large surface for entry of the gas; (2) thick mass of material; (3) uniform distribution of the gas throughout the mass; (4) light and uniform filling, excepting round the edges, where it should be slightly rammed; (5) judicious continuous regeneration *in situ* in the case of oxide of iron.

In connection with this subject, the question of purification by oxide alone naturally arises, now that incandescent lighting has brought with it a generally reduced candle power; and I should say that the wisdom or otherwise of adopting it must depend entirely upon the nature of the coal employed in any district. In England, for instance, many of the coals are naturally very dry, and yield on distillation only a small percentage of carbon dioxide —probably 0·75 to 1·25 per cent.—after proper scrubbing and washing, and at the same time yield a gas of 1 to 1½ candle power above the standard required. In such a case, a gas company or corporation, if not under the sulphur clauses, may judiciously abandon the use of lime. In Scotland, however, we have to deal with coals of a very different class, and, with the exception of a few that may be selected, they yield a gas containing from 2 to 3 per cent. of carbon dioxide before entering the purifiers, and even more in winter when the coals contain a large amount of water. Now, few companies or corporations in Scotland supply gas under 20-candle power, to maintain which, even with the carbon dioxide removed, much enriching material in the form of cannel coal or benzine has to be employed to compensate for a loss of from 8 to 12 per cent. of the lighting power. Against this, no doubt, there is a gain in the volume of the gas, due to the presence of the carbon dioxide. In a matter of this kind, however, every manager must be left to his own judgment.

It will naturally be expected that I should make some reference to the relation in which we now stand to our competing rival, the electric light, and especially on the advent of the new Osram incandescent lamp, over which electricians are justly jubilant. We can afford to congratulate them on their advance. We are all engaged in the same public service, and are both alike indispensable factors in it; and in this way we acknowledge a kind of kinship, especially in the cases where both undertakings are owned by a corporation. However, be that as it may, we are always justified in having a making-up day of prices now and again; and I presume a few figures, showing, in the simplest form, the relative positions of gas and electricity as lighting agents, would not be without interest. Thus we have—

1000 watts equal . . . 1 Board of Trade unit.
3·7 ,, ,, . . . 1 standard candle.
Hence 1000 ÷ 3·7 ,, ,, . . . 270 candles per unit.

Say 1 Board of Trade unit of 270 candles costs 4d., then—

(1) *Flat-Flame Gas v. Ordinary Incandescent Electric Light.*

1000 cubic feet of 20-candle gas = 4 candles per cubic foot.

Hence, $\frac{1000 \times 4}{270}$ = 14·8 units at 4d. = 4s. 11d. { the equivalent value of gas per 1000 cubic feet.

(2) *Incandescent Gas v. Incandescent Electric Light.*

1000 cubic feet, at 23 candles per foot = 23,000 candles.

Hence, $\frac{23,000}{270}$ = 85·18 units at 4d. = 28s. 4·72d. { the equivalent value of gas per 1000 cubic feet.

High-pressure gas, 1000 c.f., at 35 candles per foot = 35,000 candles.

Hence, $\frac{35,000}{270}$ = 129·6 units at 4d. = 43s. 2d. { the equivalent value of the gas per 1000 cubic feet.

(3) *Incandescent Gas v. New Osram "E" Lamp.*

The highest result given for the Osram lamp is 1·25 watts per candle.

Hence, $\frac{1000}{1·25}$ watts equal 800 candles per unit.

Then $\frac{23,000}{800}$ = 28·5 units at 4d. = 9s. 6d. { the equivalent value of gas per 1000 cubic feet.

Or, again, compared with high-pressure gas, 35 candles per cubic foot, we have—

$\frac{35,000}{800}$ = 43·75 units at 4d. = 14s. 7d. { the equivalent value of gas per 1000 cubic feet.

It is, perhaps, well that I should now show the rates at which current should be supplied to compete with gas of 20-candle power at 2s. 6d. per 1000 cubic feet.

	Gas Candles.	Candles per Unit.	d.	Value per Unit. d.
For flat-flame gas we have	4,000	: 270 : :	30	: 2·025
,, Incandescent gas, 23 candles per c. ft.	23,000	: 270 : :	30	: 0·352
,, ,, (high pressure), 35 c. ,, ,,	35,000	: 270 : :	30	: 0·231
,, ,, ,, ,, against Osram	35,000	: 800 : :	30	: 0·685

Thus, to compete with incandescent gas, electricity, for the ordinary carbon filament lamp, as against ordinary incandescent gas, should be 0·352d. per unit; as against high-pressure incandescent gas, it should be 0·231d. per unit; and for the Osram lamp, as against high-pressure gas, it should be 0·685d. per unit. The latter figure shows an increased value for the Osram (metallic) lamp over the carbon filament lamp of 3·7 − 1·25 = 2·45 watts, or 66·21 per cent. But, even with this advance, electricity would have to be sold at less than ¾d. per unit for incandescent lamps in order to compete with high-pressure 20-candle gas at 2s. 6d. per 1000 cubic feet. It is not a little remarkable that Dr. Auer von Welsbach, who invented the incandescent gas-mantle, should also be the inventor of the Osram (or tungsten) electric lamp, which it must be acknowledged constitute a revolution in both systems of lighting.

I might have referred to several other features of our business, which are not without interest; but time will not permit of this being done. And now, in conclusion. I quoted at the outset the text from Scripture to the effect that there is nothing new under the sun, and which is true in the sense that the laws governing the universe and matter have been the same in their nature and operation since the creation. But the Almighty has left it as a glorious inheritance to mankind to bring to light those eternal realities which lie beneath the surface for our discovery; and the reward to the individual or nation is commensurate with the zeal and mental application involved in bringing them to light for the uses of man. I trust, therefore, that, as in the past, Scotsmen will not be behind in contributing their quota to the great ocean of scientific truth, and particularly that each member of the great brotherhood of gas engineers may leave his "footprints on the sands of time," so that the generations to follow may benefit commercially and socially by the example, the mental penetration, and the wisdom of a bygone generation.

Discussion.

Mr. W. Blair (Helensburgh) expressed the thanks of the meeting to the President for his able address, and their pleasure at seeing him among them again. It was many years since they had had the pleasure of listening to the President, and of receiving instruction from one who had been capable of educating all of them in gas matters. The address they had just listened to was one of the ablest he had ever heard delivered. It took them away back to the ancient history of gas matters; and it showed that the President was still versatile in mind, as well as young in years. He had brought them up to date, and had shown them the comparative values of gas and electricity—in that matter placing the question beyond doubt. He seemed to be alive to the fact that there was something in the vertical retort system of working. They really could not discuss the address without having a little time to consider it; but he (the President) had set facts before them which would be food for thought for some time to come, and would benefit them all. The address also showed them that gas was still keeping the lead it had had for many years.

Mr. A. Yuill (Dundee) said most of them had reason to remember when the coal-tax was taken off. He considered that any Government made a mistake if they allowed an asset of the nation to be destroyed, or taken away, without getting some equivalent for it. To put a concrete case. Suppose a business man had an article to sell, which represented capital, and he sold it. No sound financier would ever dream of carrying the sum he got for it to his profits for the year. He should consider it as an asset, and lessen his liabilities at the same time as he lessened his asset. He thought that the Government, when dealing with that large and valuable asset, instead of allowing it to be destroyed or taken away, ought to have it taxed, and to put the sum of the tax to the reduction of the National Debt, the same as every man would do in allowing part of his business to be taken away. Would it be anything out of reason if the foreigner were asked to pay 2s. 6d. per ton of tax upon coal? He had not gone quite on the same lines as the President in arriving at a fair comparison in coal purchasing. He compared the value of the constituents in the coal—the volume of gas, the illuminating power, the amount of coke, the commercial value of the coke, the amount of tar, the amount of liquor, and if it were high in sulphur. In this way he got a sum which represented the difference. A coal which might cost 1s. a ton more than another kind, might be 1s. cheaper. He did not determine the value of the coal from the price, but by what he was able to take from it. He did the same with furnishings—oils, paints, and everything else. With reference to gas purification, he would like the President to inform them upon one point. He spoke of the routing of the gas. About fifteen years ago, he was making some experiments on this very point. The apparatus he

employed for the purpose was small. He had a meter that registered the foul gas from the tail of the scrubber, and was surprised to find that he was able to get a larger quantity of gas when passing the gas down than when passing it up. He mentioned this to several of his professional friends, and they endeavoured to make him believe that there was no difference in working. He was pleased to find that the President had found out what he had—and no doubt long before he did. At the present time he contemplated putting up new purifiers; and he should certainly give this method of purification serious consideration.

Mr. D. Vass (Airdrie) expressed the wish that the President should give them his impression, as a chemist, as to whether purification should not go a little further. He (Mr. Vass) had been working in this line lately, and had not gone so far as he would like; for the reason that one had to deal with works as he found them. He would like to know whether the President thought it would be an ideal form of purification to have a full set of purifiers, working with oxide, taking out all trace of sulphuretted hydrogen; then (say) a pair of purifiers with lime, to take out the carbonic acid; and then, finally, another set of oxide purifiers, to take out the bisulphide of carbon, and any other impurities which might have passed both the other stages. Sometimes a reaction took place after gas had passed through oxide and into lime; and sulphuretted hydrogen was found, whereas there was none on entering the lime. This was his chief reason for suggesting that, perhaps, another set of oxide purifiers, after the lime, would be advisable. In the papers which had been appearing from time to time, suggestions had been made that perhaps some form of automatic arrangement might be introduced for dealing with purification; but he thought they were all agreed that the mass of material was too great to admit of mechanical arrangements. They must bring the gas to the material, and not the material to the gas. The President had been dealing with this matter for many years; and he must be able to give them some information upon it.

Mr. A. Gillespie (Glasgow) could not help saying what occurred to him as he was looking at the President and hearing his address. He reminded him of two of the greatest Greeks in history—Nestor and Ulysses. The President had shown them that he had not only the experience of Nestor, but the wisdom of Ulysses.

Mr. D. Robertson (Dunoon) said, with regard to the question of whether gas should be passed either up or down the purifiers, he had had some experience of both ways of working; and he considered the method of passing the gas down through the material, whether lime or oxide, was vastly superior to passing it up. It had been well pointed out by the President that the gas, when passing down, met with no obstacle except the purifying material, until it reached the grids; and therefore it was bound to come into better contact with the purifying material than in passing upwards, because in passing up it missed a considerable proportion of the purifying material, and it only came into full contact with it near the top. There was one slight drawback which he had experienced in passing the gas down. He found if there was any moisture at all in the gas—as there very often was—the moisture was apt to drain away some small, gritty matter from the material; and this matter was apt to get into the valve. This was not likely to occur in passing up, because any such matter was deposited on the top, and did not get down into the valve.

Mr. W. Ewing (Greenock) remarked that the President had given them a treatise on gas manufacture which would be referred to in years to come, and which would be found of great use to gas engineers. The President had been one of the pioneers, on many occasions, in connection with gas manufacture. He had been a scientist and a workman of the truest type. He had educated and helped a great number of the present-day gas engineers, both to position, and when they were in position, if they got into trouble. In his address he had given them some very reliable data in connection with the comparative values of coal. This, of itself, was of vast interest; and should anyone be in difficulty in making a comparison, it was there as plain as the alphabet. The President recently introduced machinery into his works; but he noticed that he gave them no results of it. It had, of course, not been so long in use as to enable him to give them reliable data from it. The President's results were among the best in Scotland; and this proved that the works which he had managed for upwards of forty years were up-to-date. On his visit to the President's works, he was most delighted with the simplicity of them. He always maintained that the simpler the works, the better would be the results. Some liked to see a lot of machinery; but, as had been said by one of their eminent gas engineers, the best machine in the world was the man with a barrow and a shovel. They only required to read the remarks of another, a Scotchman—Mr. R. O. Paterson, of Cheltenham—who had one of the finest gas-works in the world, and whose results, if they could be beaten, could not be beaten by very much. He maintained that machinery was merely an auxiliary, and should only be employed when it could be profitably used. It was, of course, sometimes absolutely necessary. The President had referred to purification; and he (the speaker) thoroughly endorsed every word he said upon this subject. He recently introduced a set of purifiers 40 ft. by 30 ft.; and he had them so arranged that he could work them either down or up, whichever best suited the circumstances. Purification by oxide alone was in use in a large number of works in Scotland; but, as the President had said, the carbonic acid in the gas required consideration. At the present moment, he used both lime and oxide, with the result that he had a very large saving over the previous method of purification by lime only. There was one thing he missed in the address. The President made no reference to high-pressure lighting, which was of great importance at the present time. To all those who desired to extend their trunk mains, it was absolutely essential to know whether the ordinary method of low pressure or high pressure was the most economical. He believed high pressure had been introduced with success in Lochgelly; and if anyone there had experience of the system, it would be of interest to have details of it. Automatic lighting was an important matter to gas managers. Where they had a large number of lights to deal with, it would be of advantage to have them controlled from the gas-works or other suitable place.

Mr. J. Napier Myers (Saltcoats) considered that he would be a bold man who would attempt the part of critic of any paper the President produced, in the lines he had made specially his own. He would not follow up the previous speaker by referring to machinery. He was glad to find that machinery did not take up any very large part of the address, but that attention had been confined more fully to the chemical side of their industry—except where, perhaps inadvertently, the President brought in politics. He would give this view of the matter as little attention as the President had done; but he would just like to say that there might be something in the policy of allowing ships going out from this country to carry coal rather than ballast. If they had to go out in ballast, the goods which they brought in would cost more. As to the Coal Mines (Eight Hours) Bill, anyone who had been down a coal-pit would say that if there was any occupation in which eight hours should prevail, it surely should be in the case of the man who "howked" coal. He quite approved of the line the President sketched out in the matter of coal purchase. When he had the honour to be in the President's place, he sought, in a somewhat elementary way, to set forth the same doctrine. The standard he noticed the President had observed for many years was the old Lesmahagow cannel coal, which he (Mr. Myers) must confess he had never seen. The standard which he took, and which applied to most Ayrshire men, was Lugar coal. This he took as representing 100; and he endeavoured to adjust all coal in a relative value to Lugar whole-seam coal. For a year or two, he had purified his gas by oxide of iron only. He did not know that it was altogether satisfactory; but if they were to judge by absence of complaints from consumers, there would appear to be no grievance on that score. He must say that oxide had distinct advantages on the score of economy. With regard to which way the gas should be sent through the purifiers, whether upwards or downwards, he had no personal experience except in the method of working it upwards; but he very well remembered, when his father was at Broughty Ferry, that he had a set of four purifiers, working by a four-way valve. He believed that two of these worked upwards and two downwards; and the only thing he ever heard his father complain of was that where the gas worked downwards the foul gas came into contact with the water in the lutes somewhat early, and this had a detrimental effect on the side sheeting.

Mr. J. Hepworth (Edinburgh) said he thoroughly agreed with the President on the subject of the coal-tax; but he was not so sure that he could agree with him on the question of the Eight Hours Bill. He did not see that, after all, they should insist upon a workman being more than eight hours underground. But, passing from this controversial subject, he would say that he wished he had known earlier of the President's experience in purification, because when he was engaged in gas manufacture he made some experiments in the same direction, which were quite successful. But, at last—he was afraid for fear of being singular—he stuck to the method of introducing gas at the bottom of the purifiers. He believed now that he was wrong, and that if he had had the pleasure of coming into contact with the President then he should have made at least one mistake less in life. As to the comparisons of the price of coal, he thought this was a most essential matter; and if they followed the very simple, but very thorough, methods the President had adopted, it would be impossible for them to get wrong in their comparisons of value in anything they had to do with, whether coal or other material. The extraordinary figures with regard to gas and electricity—they were extraordinary to him, for he had not realized that so much could be said in favour of gas as compared with electricity—were, he thought, invaluable to every one of them. The facts with respect to the comparative costs of electricity and coal gas were so forcible that they would not be doing their duty if they did not constantly reiterate them.

Mr. J. W. Napier (Alloa) said that, looking back upon the history of the gas industry, it was, indeed, a far cry from 1869 to this year. In this period the President had occupied the chair no less than four times. The address that day was emblematical of the variety of subjects which stood before the gas manufacturer in reaching after, as far as possible, an ideal position of matters; and more especially where the President said that this was in the maximum production of gas in the retort-house, without any undue lessening of the illuminating power of the gas. It was very difficult to determine on what lines to go—more particularly when an authority in regard to the matter had recently stated that they ought to change their ideas, and, instead of high temperature carbonization, go back to low temperature. Well, this was a condition of things which might be feasible in a different commercial state of affairs; but he thought it was outside practical politics at

the present time. The vertical retort was likely to be productive of great economy in the retort-house; but he thought that the last word had not been heard as regarded the increased results to be secured from horizontals. Just recently he had been carrying out some experiments in the way of filling the retorts full, so far as a machine could do it; and without being able to state exactly, he could say that the broad results they had been able to obtain were a very largely increased yield of gas per ton of coal, and an increased make per mouthpiece. When they came to consider the essential differences between horizontal and vertical retorts, they were more mechanical than scientific. In the case of the vertical retort, the coke was discharged in a natural way; in that of the horizontal retort, it was discharged mechanically. What was to prevent them filling the horizontals with coal, and, so far as resulting gas was concerned, being able to obtain more gas than they were at present getting? Another point to which the attention of the industry should be directed was, if possible, to get a little more value from nitrogen. This was a matter in which shale works had been very much in advance of them; and he was quite sure that if, by certain conditions of working, more of the nitrogen which still remained in the coke could be obtained, very great economical advantages would result. The President, in speaking of his method of ascertaining the value of coal, mentioned that his practice was to test with water as part of the contents of the coal. He should like to know in what way he was able to do this, because it occurred to him that he would be introducing conditions of testing which would be rather foreign to the natural state of the coal as supplied to them. He would prefer to test coal, for purposes of comparison, air-dried. As one who was interested in the sale of electricity as well as gas, and in attempting to pursue a middle course in the matter, he would like to say that the extraordinary figures as to costs given by the President, all in favour of gas, must not be taken as an absolute factor when dealing with customers, either as to electric light or gas. There was a factor which was very difficult to state in mere words. He found that cost was not always sufficient to determine for a customer what he wanted. They might tell him that gas was ever so much cheaper than the electric light; but, somehow or other, he was satisfied that electric light was what he wanted, at any cost, or under any conditions.

Mr. Alex. Wilson (Glasgow) remarked that the President in his address travelled over a wide field. All gas managers were of the same opinion with reference to the coal-tax; and he need scarcely touch upon that. With regard to the price of electric light, the President had, he thought, compared the value of gas with electricity in his own town. The figures varied very much. In Glasgow they would have to take a different set of figures. With regard to carbonization in vertical or horizontal retorts, he had the pleasure last year of going round various works where vertical retorts were in use; and he obtained a great deal of information regarding their working. He went to Liverpool, London (Nine Elms), Guildford, Berlin, and Cologne; and after his visit he arrived at the conclusion that the vertical retort had come to stay. Anyone who had seen the installation at Cologne, working on such a large scale, and so quietly and so smoothly, could not help being struck with the great many advantages which could be obtained from verticals, which they could not get from horizontal retorts. Mr. Ewing said that the best machinery was the man with a shovel and a barrow. The man with a shovel was perfect; but he was only perfect so far as he could be utilized. There were advantages to be secured by using machinery which the man with a shovel and a barrow could not attain to. Those of them who had large experience with machinery knew that it required to be adapted thoroughly to the work it had to do. Coming back to vertical retorts, he saw the working of the continuous process of the Woodall-Duckham system. To an engineer it looked beautiful. It seemed perfect; but he thought that they had a good long way to go yet before they could make it a practical success. At the same time, comparing the continuous Woodall-Duckham process with the intermittent system of the German plant, he must say that he had a leaning to continuous carbonization. One great advantage he believed they would get with the use of vertical retorts would be in the matter of coke. He put up a small testing retort, to see how it would act with the coal they got in Glasgow; and he was surprised to find how very evenly ordinary splint coal coked when it was subjected to the pressure due to the weight of coal in the retort. He did not use the Woodall-Duckham continuous carbonizing, nor yet the German system of charging and drawing. He tried between the two; and he thought that somewhere between the two was going to be the method that they in Scotland, at any rate, were to get the most benefit from. There were a great many advantages to be obtained from the vertical-retort system of working, of which they had very little idea. Coal testing was rather a thorny subject. Seeing the President had such a wide reputation in the matter, and had had so much practice, the figures he had given would help most of them. His was very like the system they used in Glasgow, with the difference only that, in estimating the value of the coke, the President took the combustible matter. This was all right in its way; but he thought he was doing the best class of coal an injustice if he did not make an extra depreciation on account of the ash. When they dealt with a lower class of coal, there should be an extra deduction on account of the falling off of the coke. He had never studied the subject of passing the gas downwards in purification. He had looked at it, but had never practised it, for the very good reason that in the works he had the direction of for a long time the purifiers were on the small side; and in trying to pass the gas downwards there would have been a good deal more pressure on the top, and consequently on the lutes, than in passing upwards. He considered there was an advantage in passing the gas downwards, in that they had a much larger area for the lime to cake-over, because, in passing upwards, they had only the spaces between the grids. This was a point which he thought was worthy of consideration.

Mr. W. Blair said he had had experience of passing the gas both upwards and downwards through the purifiers. He passed the gas upwards because his purifiers were rather low set in the ground, and the moisture in the lime was condensed out of it when passing downwards, and settled in the bottom of the box. They were rather deficient in scrubbing arrangements, and this water contained ammonia the equivalent of $1\frac{1}{2}^{\circ}$ or 2° Twaddel; consequently they never could get clean gas. They had also to contend with a back-pressure of 24 inches with an 11-inch seal in the lutes. The only way he could get over this difficulty was by filling the lute with puddled clay. Possibly, if the President had had a few experiences of this kind, he would have been inclined to send the gas upwards.

Mr. W. B. M'Lusky said the address the President had given them was really more of the nature of a lecture to gas managers than an ordinary Chairman's address. If he were to put an interpretation upon the scientific side of the address, he would say that many of the directions contained in it could be put into practice better in a very small works than in an ordinary-sized works. For example, the manager of a gas-works with one retort could put into practice the theories the President had deduced from his own practice far better than the manager of a larger works. He could remember, with a Hislop's setting of four retorts, having them filled with Redding splint. In making a statement of this kind, he thought it better to name the coal, so that managers could try the same, or a similar, kind, and see whether the statement was correct or not. When managers of small works using cannel heard of the retorts being filled, they must have some doubt, knowing that cannel was more difficult to distil than common coal. The President and the late Mr. Young had made it perfectly clear that to distil cannel radiant heat waves over the charge were necessary; but in distilling coal of a coking nature, it was better to fill the retort. It was physically and chemically correct—chemically because it was not necessary to have the radiant heat waves, and physically because the deeper the charge of coal the nearer the coal got to the retort. He had made more gas in a 20 in. by 15 in. retort than could be produced in the same oven in retorts 27 in. by 16 in. When a heavy charge was put into a small retort, they got more coal carbonized in a given extent of oven, and they obtained much higher illuminating power than they could otherwise get from a common coal. But take the case of cannel. The managers of small works would bear him out that the bulk of the cannel could not be charged heavily, or the charges would be drawn blazing. There was another point in connection with heavy charging, which was that the heavy charge did not take any longer to work off than did a light one. He was speaking of retorts which were persistently heated with a regular supply of producer gas, not those which were only intermittently or occasionally heated by a common furnace which was blazing hot for fifteen minutes or half-an-hour, and produced no heat for an equal period of time. There was also the back-pressure on the dip-pipes to be considered, in the matter of heavy charging. After introducing retort-house governors, he found that his chart was not so perfect as some he had seen published. He had a variation of about one-tenth of an inch at the governor-inlet. To follow the matter through, he had every dip-pipe bored, and portable gauges fixed, for taking the back-pressure on the dip-pipes; and he could recommend this to anyone who had not yet adopted it, as being an extremely safe and perfect method of arriving at the actual amount of the back-pressure. Unaccounted-for gas was another item which presented very peculiar features in different towns. He had occasion, about a month ago, to examine the affairs of a small gas undertaking, and discovered that the Company spent 1s. 8d. per 1000 cubic feet in searching for escapes in the town, because it had been found that the leakage was 15 per cent. The Company were prepared to part with their undertaking for a very small price, because they felt their main-pipes were done, and a great part of the fittings were ready for the scrap-heap. But, looking into the matter, he found the actual loss of gas per mile of main was only one-fifth of the average in Scotland; and if the Company had had 50 per cent. leakage, they would only have had the same proportion as was found all over Scotland. It was a comforting statement to managers of small undertakings who had 15 per cent. leakage to find that it was not leakage after all, but the long exposure of the gas, over an immense area, compared with larger towns, where the mileage of mains was comparatively low. With regard to working in an amicable way with their brother lighting engineers on the electrical side, there was nothing to be gained by fighting electricity; but there was a great deal which could be done by attending to their own work—such as seeing that their street-lamps were in good order. No town council or gas company would grudge time that was spent in keeping the lamps right. They would, on the other hand, find that an Osram lamp of 40-candle power was equal to, if not better than, an incandescent street-lamp that was not attended to. Taking the case, however, of a small town—a

town of anything up to 5000 inhabitants—where the street-lamps were not lighted in the summer months, giving a lighting year of 2700 hours, the consumption of electricity, with an Osram lamp, would be 175 units per annum; and, taking the President's figures, which were reliable, 1¼ watts per candle would cost 69s. per lamp per annum, for energy and repairs and maintenance, because in that small town the lamps would require to be renewed some three times. Every Osram lamp cost 4s., whereas an incandescent gas mantle cost only about 2d. There was a vast difference there in the cost of renewals. This was a point they ought to bring home. In such a case, gas would be of equal value at 12s. 9d. per 1000 cubic feet.

The PRESIDENT, in closing the discussion, thanked Mr. Blair for his remarks, which he appreciated very much. He thought the statements in his address went to prove that when they took gas in at the surface of a purifier they had not the same resistance as when they took it in at the bottom, where it had first to pass through the grids, thereby increasing the pressure. In addition, in taking the gas down, they had a far better diffusion through the mass. If they sent it up, the grids divided it into a number of streams, especially with thin layers of material on the trays; whereas, by passing the gas down, they forced it into all the interstices of the material, and that under a reduced pressure. A very fair working area was an average of 2 square feet of surface per 1000 cubic feet of gas made in 24 hours. This would give about 1·6 cubic feet per square foot per minute. He did not like to give less than 2 square feet; and in laying down new plant, he gave up to 4 square feet. He maintained that area was a very important consideration; but depth of material was also important. He had not had any difficulty with regard to the matter referred to by one or two gentlemen, nor any damaging effect to the covers or the lutes. The same lutes and covers had been in use for thirty years. It was supposed that, in entering at the top, any moisture in the gas was trapped at the surface of the purifying material; but to this he attached no importance. In regard to pressure on the covers, this would affect the first purifier only; but, again, there was no high pressure on his system of working. Mr. Ewing referred to the matter of high-pressure gas. There were many subjects which might have been discussed; but he thought that "boosting" a low-pressure main was to be commended. The delivery of gas at high pressure to a low-pressure main—it might be miles away—and introducing it to the main there, through reducing valves, was altogether ideal, and was certain to be extensively adopted. Mr. Myers referred to the politics he had introduced. He had been asked by a friend the other day what the Corporation were doing in the way of defeating the Eight Hours Bill; and his reply was that he was very much afraid that the Paisley Town Council would not interfere in such a matter. He had been in a mine, and knew what a miner's work was. His experience of miners was that they would only work so many hours per week; and in many cases they would rather work a longer day for part of the week, with a view to getting off longer at the end of the week. But, if the Bill passed, the men would not be allowed to remain in the mine beyond a certain number of hours. He did not see that there was any need for legislating for these men, as if they were boys; and it was unquestionable that the effect of the Bill would be to raise the price of coal very considerably, which would be a very serious matter for the working classes of this country, to say nothing about manufacturers. In a case of this kind, they must set politics aside, and consider what was good for the whole. He had to thank Mr. Hepworth for his kind remarks. Mr. Napier referred to the question of water in coal. In his address, his remarks related to an experimental plant, not to a large scale working, because he had all along maintained that to have tests on a large scale was absolutely useless. They could not rely upon the retorts being altogether tight, or the heat being what it should be; but if they used a small apparatus, they could adjust it to a nicety, according to the quality of the coal, which was an essential element. Therefore, he took a section of a seam, and he took part of it, and saturated it, to see how much water it would contain. Then he dried it, which was practically equivalent to the air-drying process Mr. Napier referred to, or equal to two months in store; but he maintained that without some such data they could have no reliable comparative results. If they had a coal showing a variation of (say) 3 per cent. of water, they had a difference of 10⅓ or 11 per cent. in the gaseous results. They would be apt to say that it was not the same coal they tested some months ago; but if they had determined the amount of water in it, they would find it to be exactly the same coal. Mr. Wilson referred to the Osram lamp. He was quite correct. He did not go into details, because it was a controversial subject. He was very pleased indeed to hear Mr. Wilson's statement about his visit to places where they had vertical retorts in use. He thoroughly agreed with him that the vertical-retort system was entitled to careful consideration; and he had no doubt that, as time went on, progress would be made in its development. Mr. M'Lusky referred to the distillation of cannel and of coking coal. He was perfectly correct. There was a large difference between the two classes of coal. They required radiant heat in the case of cannel. They could not pack it up in retorts in the same way as common coal. They could put common coal into retorts in a mass, and he considered with very beneficial results. He thought he had now answered all the questions put to him in a fair way; and he thanked them for their kind attention.

Mr. A. WILSON moved a vote of thanks to the President for his valuable address, and also for his extra valuable reply to the various speakers. There could be only one opinion, and that was that the President had filled the position of Chairman with acceptance to them all, and with the greatest honour to himself. They could have expected nothing else from a man of Mr. Hislop's experience, and from the results of the other papers he had put before them. In the last paragraph of his address, he had spoken of "leaving footprints upon the sands of time." He thought that Mr. Hislop might do a great deal more than leave his footprints on the sands; and that he might take into consideration in time the making of his footprints permanent, and give them a treatise upon the subjects that he had so fully gone into. They had had papers from him now and again; and if he were to bring these papers, and his other experiences, into one book, perhaps he might make his footprints more permanent, and this would certainly be of great value to gas managers, not only in Scotland, but throughout the world. From the very beginning Mr. Hislop had shown that he went deeply into the subjects he studied, and was not afraid to try experiments. He had the courage of his opinions, and followed things out to a conclusion, which was what all of them were not always able to do. The success of the meeting was entirely due to him; and he therefore begged to propose that they accord him a very hearty vote of thanks.

Mr. D. MACFIE (Edinburgh) seconded. The meeting, he said, would be a memorable one. The semi-jubilee of the inauguration of the informal meetings had been appropriately celebrated by the splendid contribution they had had to its records from Mr. Hislop, who was, indeed, the Nestor of Scottish gas engineers.

The motion having been enthusiastically agreed to,

The PRESIDENT thanked the members, saying he was somewhat reluctant to take the duty; but after a little pressure, he thought he might do worse than be among them, and do some work again. It was very gratifying to him to be there that day, and to see so many well-known faces. It certainly took him back a long way now. He had seen many come and go in the gas profession; and he did not suppose there were many alive now who were when he joined it, somewhere about sixty years ago.

Mr. W. KEY (Glasgow, late of Tradeston Gas-Works) said it was in the year 1869 that he first met Mr. Hislop, at a meeting of the North British Association, when they went down the Kirkland Colliery. This took him back a good long distance too; and he regretted to see how few there were there who were then gas managers.

THE M'GILCHRIST MEMORIAL.

Mr. M'LUSKY, on behalf of the "M'Gilchrist Memorial Committee," reported that the North British Association of Gas Managers had resolved to get up a memorial to the late Mr. James M'Gilchrist, of Dumbarton, but, believing that there was more enthusiasm in the subject in the Informal Meeting than in their own Association, they handed the matter over to them; and it had been carried out. The Committee had completed their work. They had a proof of the proposed medallion, which he submitted. [A reproduction of the design is given on p. 22.] All the Committee wanted this meeting to do was to give them instructions to proceed with the preparation of the medallion, so that it would be ready for next year, and that the President on that occasion might wear it at the meeting. On the back of the medallion there would be room for 42 names; so that the Presidents, year after year, might be noted on it.

The PRESIDENT said he hoped they would homologate the action of the Committee in what they had done; and he had to ask them to agree to what they proposed, and to allow the Committee to proceed with the completion of the medallion.

This was unanimously agreed to.

NEXT YEAR'S PRESIDENT.

Mr. M'LUSKY proposed Mr. D. Vass, of Airdrie, as President of next year's meeting, which was agreed to.

Mr. VASS expressed his thanks for the honour, which he appreciated very highly.

A company of over a hundred afterwards sat down to dinner in the hotel—Mr. HISLOP in the chair. The toasts which were afterwards honoured were: "The Technical Press," proposed by Mr. ALEX. WILSON; "Kindred Associations," proposed by Mr. W. BLAIR, and acknowledged by Mr. W. WILSON, of Falkirk, the President of the Scottish Junior Gas Association — Western District; and "The Society of British Gas Industries," proposed by Mr. D. VASS, and acknowledged by Mr. A. P. MAIN.

Tapping Mains under Pressure.—Mr. A. O. Ruscoe, of Manchester, who is a specialist in making connections with gas and water mains under pressure, a few days ago drilled a 16-inch main and took off an 8-inch connection without in the slightest disturbing the flow of gas in the main. The work was done for the Wandsworth and Putney Gas Company.

London and Southern District Junior Gas Association.—We learn from the Hon. Secretary (Mr. J. G. Clark) that a meeting of the Association will be held next Friday at the Cripplegate Institute, when Mr. P. J. Smithers will read a paper entitled "Gas Fire and Stove Defects." On Saturday, the 25th inst., the members will pay a visit to the Stepney works of the Commercial Gas Company; and arrangements are being made for an inspection of the Southend Gas-Works on May 16.

YORKSHIRE JUNIOR GAS ASSOCIATION.

The opportunity of seeing the winning of the raw materials from which gas-retorts and the various kinds of gas-works bricks are made, and of following the processes of their manufacture, brought together a very large muster of the members of the Yorkshire Junior Gas Association last Saturday, at the Cinder Hills Fire-Clay Works of Messrs. Joseph Morton, Limited, at Halifax. As the works are at some distance from the station, the firm, with thoughtful kindness, had a number of waggonettes in readiness at the station to convey the visitors to them.

The business was established 125 years ago, by the family that now own it. It finds employment for nearly 400 hands, and, unlike some works in this line, no females are employed. Both the Cinder Hills and the neighbouring Siddal works were inspected; the third works, at Hipperholme, where similar goods are manufactured, was rather too far distant to be included in an afternoon's visit. The two works inspected stand at some considerable height up the hillside which forms the eastern side of the Halifax valley, and just before it joins the valley of the Calder. This hillside marks here the commencement of the coal measures as one travels eastward from the ridge of the Pennine Chain; consequently as the strata dip to the east, seams which further east are considerably below sea-level are here 500 to 650 feet above it. The seams of fire-clay, coal, and gannister are worked from drifts which have been driven horizontally into the hillside; the entrance to these drifts being on the works. The advantage of this method of working is obvious; no pumping is required, as the water runs off the workings by gravitation. The fire-clay worked is a seam of about 7 feet in depth, of which only the top 3 feet is used; the lower portion being of an inferior quality. Immediately above the clay is a seam of good coal, from 8 to 11 inches thick, which is dug out after the clay has been removed, and being of a highly suitable character is utilized for firing the kilns. The gannister or silica rock is a little lower down, and varies in depth up to 20 feet, sometimes thinning out and disappearing altogether. A shale somewhat higher up the hillside is used for making ordinary red bricks. An outcrop of each of these seams had been bared for inspection.

Mr. Joseph Morton, the head of the firm, his son, Mr. Harold Morton, and Messrs. Rhodes, Clay, Brothers, Shore, and Clark met the visitors, and acted as guides. Both above and below ground a number of the employees were on duty, so that all the operations were seen in actual progress. No pains had been spared to make the visit as full of interest and instruction as possible; and members availed themselves to the full of the opportunity of getting a clear insight into the processes of an industry so intimately connected with their own. The raw clay was seen and handled; and then the processes of grinding and tempering were watched. For hand-moulded bricks and tiles, the clay is ground with water in edge-runner grinding machines, until the right consistency is obtained. This clay was seen being hand-moulded into ordinary fire-clay bricks, of which a man makes at least 3000 a day, and into tiles and blocks of various special shapes—several being for segmental gas-retorts, for coke-ovens, and for lime-kilns. The drying-rooms were traversed, where all these hand-moulded articles stand on a hollow floor under which the waste steam circulates, and so removes much of the excess moisture in the bricks. Various machines for pressing and shaping the clay into the less commonly ordered forms were shown, also the machines for wire-cutting bricks. On these works, cutting machines are comparatively little used, except for making special new sizes of bricks. Attention was called to the very extensive range of sizes and shapes of bricks and tiles to be seen all around—several pattern makers being continuously employed in preparing new moulds.

Machine-made bricks were next seen in course of manufacture. Here the clay is ground dry in edge-runner mills, whose bottom plates are perforated. The powdered clay which falls through is taken by an elevator to a tempering machine, where it is mixed with a little water into a stiff paste, which passes to the various machines and is compressed in moulds. A machine can turn out about 11,000 ordinary fire-clay bricks in one day. In order that the bricks may come out clean, and not cling to the moulds or dies, they are coated in the moulds with creosote oil. Machine-made bricks are made from a very stiff clay; and as they contain so little moisture they need no preliminary drying, but are taken direct to the kilns for burning. It was pointed out that this machine, whose ease and certainty of working was so much admired, is not equally adapted for all clays. In the present case, the clay used suits the machine admirably, and imperfect bricks are but rarely turned out by it. Machines were also seen making bricks for segmental gas-retorts.

The process of firing the bricks was next examined. Some of the old-fashioned "up and down" kilns were in operation, and others were seen empty. These hold about 30,000 bricks. The method of using them was illustrated from within. Fires are made in openings round the walls, and the entering flames and hot gases are deflected by a wall to the top of the kiln, whence they pass down among the bricks, and out at openings in the floor leading to the chimney flue. All the heat in the gases in the flue is wasted, as in direct-fired gas-settings. In the continuous kilns seen, all this heat in the waste gases is so fully recovered that a man can enter the main flue for the purpose of cleaning out the soot, &c., while the kiln is in full operation. In the chief kiln seen, 24 "chambers" are arranged in an ellipse; the actual brick-burning space being a continuous tunnel, divided temporarily into chambers by movable metal sheets. Each chamber is provided with a fire-place, dampers, &c. The chimney-pull draws air in below the fire-bars, and draws the hot gas along the kiln until it reaches the damper opened to the main-flue. From time to time a fire is allowed to burn out, and another one is lit on ahead; while to recover the heat stored up in the completely burned and still glowing bricks, air is drawn in through these hot chambers, and passed forward along the chambers. Out of the 24 chambers, two or three are under fire, while five or six behind have air drawn through them. Ahead of the heated chambers are a number of closed chambers containing green bricks; then come one or two being emptied and refilled; and the rest are slowly cooling with the air currents cut off by having the dampers closed. This kiln turns out about 100,000 bricks a week.

Very special interest was shown in the manufacture of retorts. The clay is first ground dry, then tempered with water to the right consistency as in the other machines, and taken to the retort machine, where the retort is shaped by the clay being forced through dies of the required section under a hydraulic pressure of 100 to 120 tons. Though not worked to anything like its maximum speed, the machine awakened much surprise by the rate at which it turned out a length of retort. After being cut off by a wire, the retort is supported by battens and stays, and removed to the neighbouring store to dry. Standing on end, it is allowed to dry spontaneously, without heat being applied. Just now, three to four weeks are allowed for this; the time being longer in winter, and less in summer. After standing a few days, the retort is carefully stood on its other end, and fresh clay attached by hand to form the flange of the mouthpiece-end. Samples of many shapes and sizes of retorts, both horizontals and inclines, were standing around drying; and a special kiln for burning retorts was seen and explored. These kilns are always made on the "up-and-down" principle. All the retorts actually being moulded were horizontal ones. The visitors were shown the parts of the moulds used in making tapered inclined retorts; and the patent device for gradually expanding the dies was examined with close attention. About 600-horse power is used on the works in grinding and tempering the clay, and in driving the machinery. The governing of the engine is an important consideration on a brick-works, where the changes of demand for power are both rapid and extreme; from 50 to 60 horse power being often taken off suddenly.

The final scene had been awaited with considerable interest. An expedition to the working face of the clay seams had been promised; and a goodly number of the members donned over-alls and essayed the journey. Apart from the interest of the actual working operations, the journey was in itself of no small enjoyment and novelty. Each coiled up as best he could arrange in a clay corve, and with lighted taper in hand, the journey commenced with a string of these corves being pulled by a pony for some hundreds of yards. Then, when the gallery height was reduced to about 3 feet, each corve was pushed along by the strong arms of a clay miner.

On the completion of the visit, the members travelled back to Halifax, and were entertained by the firm to dinner at the Old Cock Hotel—Mr. Joseph Morton occupying the chair. On the proposition of Mr. J. H. Hill, the President, seconded by Mr. G. W. Fligg, the ex-President, a cordial vote of thanks was enthusiastically given to Mr. Morton, his fellow Directors, and his assistants who had officiated as guides. After Mr. Morton's reply, short speeches emphasizing the value of such visits to the members of the Junior Associations were made by the Visiting Engineers, Mr. J. Wilkinson, of Halifax, and Mr. A. W. Bissell, of Sowerby Bridge, and by Mr. W. Cranfield.

Recent French experiments go to show that the use of a cement wash at the joint is of material value in obtaining a good connection between old and new concrete work. Excessive tamping of the new work near the joint adds appreciably to the strength of the connection, whether the cement wash is used there or not.

A semi-automatic gas-engine of novel design has recently been devised, involving the application of valve mechanism of the detachable or "hit and miss" type, to the exhaust-valve; the gear being spring-retained in unlatched or non-operative position ordinarily, so that unless specially actuated the valve does not open to the exhaust on the exhaust stroke. According to particulars in "Engineering Record," the spring holding the latch or dog is attached to a piston in a miniature cylinder connected into one side of the main engine cylinder at such a point near the crank end that the engine piston uncovers the opening at its extreme outer stroke only, and admits the pressure of the exploded gases to it. The movement of the exhaust-valve push-rod is so timed in relation to the admission of pressure to the miniature cylinder that the latch which is forced out by the latter is caught, and causes the exhaust-valve to open for the regular exhaust function. If, however, the explosive mixture has exploded, due to the omission of the spark for speed regulation, the miniature piston is not actuated, and the explosive charge is not exhausted and wasted as with the usual gas-engine construction. Engines of this make are said to regulate very closely, and to show a favourable fuel consumption for the small sizes of units.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

Visit to the North Berwick Gas-Works.

Last Saturday afternoon, the Eastern District of the Association brought the work of the session to a close by paying a visit to the Corporation Gas-Works at North Berwick. About twenty members attended. At the railway station, they were received by Mr. G. Nelson, the Convener of the Gas Committee, and Mr. A. D. Wallace, the Town Clerk. The Corporation had provided brakes, in which the party were driven to the gas-works, where they were received by the Manager, Mr. James Black. An inspection of the works was then commenced; Mr. Black acting as guide, and explaining the novelties in the plant as the party proceeded. Beginning with the retort-house, he showed that since the works were opened—in October, 1904—he had introduced a turntable, by means of which he is able to take coal-waggons into the store, and not merely past the end of it; thereby effecting much saving of labour. A weighbridge has also been put down in front of the retort-bench—Mr. Black being a believer in the practice of weighing every charge of coal; and a steam-pump has been fitted up, which is used to keep water from coming into the lower floor of the bench. At the end of last year, Mr. Black began to purify the gas chiefly by oxide of iron, using three boxes of oxide and one of lime. Since then about 9 million cubic feet of gas have passed through the purifiers; and while the first box shows fouling, there is no trace of it in the second. Mr. Black explained that it is his intention not to open any of the boxes until the second becomes as foul as the first. He calculates that the economy will be such that in one season he will save as much as the cost of making the change. In the governor-house, he showed the method of lighting and extinguishing the street-lamps in North Berwick. In all the lamps, incandescent gas-burners have been fitted with the arrangement for raising and lowering the lights, patented by Messrs. Alder and Mackay, of Edinburgh. A handle has been placed upon the governor, and by depressing it the pressure is taken off to the extent of about 15-10ths. This turns up the lights; and the same operation, repeated after a minute or two, turns them down. It requires about 30 seconds for the arrangement to take effect at the farthest point of the lighting area, which is about two miles from the works. With the exception of the items here mentioned, the works are as when opened, at which time they were described and illustrated in the "JOURNAL" (Vol. LXXXVIII., p. 180).

Having seen the works, the party assembled in the office.

Mr. BLACK explained that there was a very great difference between the works the members had just seen and the old ones. When he first went to North Berwick, some twenty-seven years ago, they were making about 6 million cubic feet of gas per annum. It was shortly after this that the boom in house-building began. The storage capacity of the works was about 16,000 cubic feet; and the purifying was done in two small boxes, 6 ft. by 4 ft. Two years afterwards, he put in two purifiers 6 feet square, and two others 6 ft. by 4 ft. The most gas he could get out of the coal was 9000 cubic feet per ton; and the coal then was as good as that which they were now carbonizing. When the summer visitors were in the town, they used a great deal of gas; and he made as much in September as in December. About fourteen years ago, the Corporation acquired the gas undertaking; the late Mr. Robert Mitchell, of Edinburgh, being the Arbiter for the Company, and the late Mr. James M'Gilchrist, of Dumbarton, acting for the Corporation. Mr. Mitchell was retained as Consulting Engineer; and on his advice they put in some new plant. They held several cookery exhibitions, which gave the gas consumption a great lift. It went up a couple of millions a year for a time. New purifiers became necessary, as he had seen them changed twice every 24 hours. At last they had to look out for a site for new gas-works; and the members had seen the result. When he first went to North Berwick, they used about 600 tons of coal per annum. This year they had used 2184 tons, and the production of gas had been 24,280,000 cubic feet; the average yield being now 10,185 cubic feet per ton. The price had been reduced from 6s. 8d. to 3s. 6½d. The holder capacity was now 120,000 cubic feet, and the maximum daily make 100,000 cubic feet.

The PRESIDENT (Mr. D. Bisset, of Edinburgh) said that during the session the Association had had a series of most interesting papers read at their meetings, and they had had several very pleasant and profitable visits to works. That day they had been privileged to see the well-appointed gas-works belonging to the Corporation of North Berwick; and he was sure the members would take away with them some very useful ideas as to how to lay down modern gas-works. He could not help thinking that works such as those they had just inspected would be a set-off and an ornament to any town. They were a credit alike to the Engineer who designed them, to the Corporation who owned them, and to Mr. Black, who worked and managed them. He understood that the consumers had risen since 1901 from 680 to nearly 1000. The public lamps in 1901 numbered 137, of which only 12 were incandescent; whereas now there were 174, all incandescent, and all fitted with the automatic lighting and extinguishing arrangement of Messrs. Alder and Mackay. He was sure the members would all agree with him in wishing great success and prosperity to the North Berwick gas undertaking. He proposed a hearty vote of thanks to the Corporation for affording them the privilege of visiting their gas-works, and to the officials who had received them.

The HON. SECRETARY (Mr. John R. Moyes, of Edinburgh), in seconding the motion, said the members had derived a great lesson from the visit, because the works were such as would be suitable for a young man to have charge of in starting his career in life.

Mr. G. NELSON returned thanks. He said that they were very pleased to have the Junior Gas Association with them. They were very anxious to learn as much as possible about the working of the oxide purification system, and he had been speaking to one or two of the members who had been using it. At first they were a little dubious as to whether the illuminating power of the gas would be as good with the oxide as with the lime only; but he was now convinced that it was quite as good.

Mr. A. D. WALLACE also returned thanks.

Mr. BLACK expressed his extreme obligation to the members for their vote of thanks. He said he was glad to see so many young men present, and hoped they would take full advantage of their opportunities.

The visitors were then driven back to the town, and along the sea-front, returning to the Quadrant, where they dispersed.

The lighting of the street-lamps was accelerated by about an hour, to enable the members to see the working of the system. The lamps, so far as they were in sight, went up practically simultaneously; and the impression formed was that the system was in every way to be highly commended.

PRESENTATION TO MR. OVERING.

There was an item of more than ordinary interest in the proceedings of the Yorkshire Commercial Section meeting held at the Great Northern Victoria Hotel, Bradford, last Thursday. Readers are already aware that Mr. T. D. Overing, the Manager of the Birstall Urban District Council's gas and water works, is about to leave to take up the post of Chief Engineer at Para, Brazil. At the meeting referred to, an illuminated address was presented to Mr. Overing by Mr. Charles Wood on behalf of the section; the following being the inscription:—

We, the undersigned members of the Yorkshire Commercial Section of Gas Managers, present this address to Mr. Thomas D. Overing on the occasion of his leaving Birstall (after 8½ years' service as Gas and Water Manager) to take up the post of Chief Engineer at the Para, Brazil, Gas-Works. Though we view with deep regret his forthcoming departure from the old country, the occasion enables us to place on record our appreciation of his loyalty to the Yorkshire Commercial Section, our admiration for his devoted and able services to the gas industry, our affection for him as a colleague, and our good wishes for his future health, happiness, and prosperity.

Chas. Wood (*President*)	J. Nicholson	G. W. Fligg
Jno. Wilkinson (Halifax)	D. Gillespie	F. H. Pickles
Jas. Parkinson	R. Watson	E. O. Watson
A. Bromley	F. D. Richmond	G. H. Niven
E. G. Grimshaw	E. J. Wellens	Wm. Everitt
H. Smith	W. J. Hartley	Jas. Wilkinson
H. Townsend	G. W. Lupton	H. J. Hemingway
Jno. Furniss	Jno. Laycock	J. H. Woodward
A. E. Mottram	A. E. Buckley	J. H. Brearley
Jno. Wilkinson (Pudsey)	B. Arnold	(*Hon. Secretary*).
E. H. Hudson	J. W. Turner	

Mr. Overing acknowledged the gift in a few suitable words; and, at the close of the meeting, he was the recipient of many hearty good wishes. He sails for Para early next month.

Tests of English and American Lamps.

In the course of an article on "Working Standards of Light and their Use in the Photometry of Gas," Mr. Charles O. Bond, in the March number of the "JOURNAL" of the Franklin Institute, refers to the constancy of the pentane lamp. Out of 64 pentane lamps standardized by the Photometer Department at the Philadelphia Gas-Works, eight have fallen more than 1½ per cent. from the normal as compared with a certified imported English pentane lamp, and three of these were found to have done so through faults in construction. As indicative of the constancy of pentane lamps upon intercomparison, Mr. Bond cites the following instance: English lamp No. 51 was imported from London in January, 1900, having an ascribed value of 10·0055 candles, sealed and certified, as compared with one of the lamps proved by the Referees to give a value of 10 candles. On May 13, 1904, this lamp (value 10 candles) imparted a value of 10·04 candles to American lamp No. 2 as an average of 60 readings. On May 17, 1905, the latter lamp imparted a value to lamp No. 89 of 10·02 candles as an average of 100 readings. In the summer of 1907, this lamp was taken to London, its value being unknown to the Gas Referees, and it was compared with one of their proved lamps of 10-candle value. Upon this test, the American lamp had ascribed to it a value of 9·99 candles, against the above-mentioned value of 10·02 candles which it bore from calibration on the other side of the Atlantic. This is a remarkable agreement; there being a discrepancy of only 0·03 candle. Mr. Bond says it is apparent that "the pentane lamp has the quality of constancy, and is therefore able to act as a vehicle in conveying a given value to any of our working standards in gas photometry. Being constant for a given atmospheric condition, the original lamp in London may also be depended upon to maintain accurately the unit of light value."

THE CHEMIST AND THE COAL-TAR INDUSTRY.

At a recent Meeting of the New York Section of the Society of Chemical Industry, Mr. H. A. METZ addressed the members on the subject of "The Services Rendered by the Chemist in the Development of the Coal-Tar Industry." A report of his remarks appears in the current number of the Society's "Journal," from which it is reproduced.

In taking a broad view of this subject, we may say that, in giving an account of the services of the chemist in the industry—or, better, industries—originating in the utilization of the various products contained in the substance known as coal tar, it is necessary to give a complete history of these industries. It is impossible to separate in any way the scientific and the commercial development, as they are so closely interwoven in the advance made in the manufacture of the various products, whether colouring matters, medicines, technical products, or raw materials. The whole displays a system of evolution which we can appreciate more thoroughly than those in some other branches of science, as we have before us the visible results of each step forward in working out the possibilities of the application of trained scientific knowledge to the problem of these industries.

Though in the first half of the Nineteenth Century several investigators in the examination of certain substances, obtained in various ways, discovered aniline and nitrobenzene, and the fact that these substances yielded coloured bodies under suitable conditions was known, it was not till the year 1856 that the first of what are now commonly known as the "aniline dyes" was discovered and manufactured commercially. This discovery was due to the late William Henry Perkin. Some two years after the appearance of Perkin's mauve on the market, Hofmann discovered magenta or fuchsine; and the next year Verguin manufactured it commercially. Medlock and Nicholson introduced the arsenious acid process for its manufacture in 1860. In the same year, Girard and De Laire discovered that by phenylating rosaniline or magenta, a blue colouring matter was obtained, known as spirit blue, being only soluble in alcohol; and in 1862, Nicholson discovered that this spirit blue, by the action of sulphuric acid, could be sulphonated and made soluble in water. This introduced a new series of colours, known as soluble blues, water blues, and alkali blues.

These dyestuffs all belong to the triphenylmethane group of colours. In 1858, P. Griess discovered what is known as the diazo reaction, which opened the way to what is now the largest and most useful group of colours in practical use, known as "azo colours." The first of these was introduced by Simpson, Maule, and Nicholson in 1863, and called "aniline yellow." This was amino-azo-benzene; and the firm introduced in the same year the methylated and ethylated rosanilines discovered by Hofmann the year before. In 1863, Lightfoot, in England, discovered the method of forming on the vegetable fibres what is known as "aniline black." This, though one of the most widely known of the colouring matters, defied analysis until last year, when R. Willstaetter and C. Moore claimed to have discovered the constitution of this elusive body.

The dyestuff industry at this time was located principally in England, as the names of the new colours which appeared from time to time show. But, owing to the advances of technical education in France and later in Germany, it soon passed to these countries. In 1868, Graebe and Liebermann announced the synthesis of alizarin from anthracene in coal tar. The original source of this was madder-root, the product of almost all warm climates, and up to that time the most important of the natural red dyestuffs. The synthetic production of the pure colouring matter practically extinguished this trade, and limited the profitable production to two or three countries, so that "madder-root" became largely a matter of name. The synthesis of alizarin from anthracene led not only to immediate results in regard to the red dyestuff, but started researches for other possibilities in the production of dyestuffs from anthracene.

The effect of these efforts has been most marked. After the reds appeared orange, blue, and brown, directly derived from anthracene and alizarine. Then, somewhat later, R. E. Schmidt brought out the higher oxyanthraquinone products, which had marked advantages over the older dyestuffs. Next appeared the dyestuffs found by the condensation of various amino bodies with anthraquinone and its derivatives; and the latest (within two or three years) vat-dyeing anthracene dyestuffs. All these are the result of patient, untiring work on the part of chemists in the employ of several large German manufacturing establishments.

The first of the aniline colours was found to require in dyeing cotton a mordant of some kind. Either the fibre had to be treated with tannin or alum, or another metallic salt had to be used in the dye-bath. This condition continued until 1884, when Boettiger patented Congo red, which died unmordanted cotton in a bath containing merely common salt. This was followed by others in rapid succession, and to-day these dyestuffs, often called the "tetrazo dyestuffs," are one of the largest groups of colouring matters known. To this class belong the colours which are developed on the fibre; the first being the primuline yellow introduced in 1887. This is the prototype of all the dyestuffs which are dyed and afterwards developed on the fibre—a class in very general use on account of the fastness of the resulting shades.

In 1873, Croissant and Bretonnier introduced a dyestuff which they obtained by heating organic substances, such as bran, sawdust, &c., with sodium sulphide, known commercially as "cachou de Laval." This was used in dyeing on a limited scale; but the method of making attracted little attention until 1890 and 1893, when Turners in England and Raymond Vidal in France brought out the first of what are known as sulphide or sulphur blacks. This opened up a new field, which was immediately entered by numerous investigators; and the results are shown in the sample cards of the various manufacturers.

The greatest recent development as a result of chemical research is the manufacture and sale of synthetic indigo. The original processes for the synthesis of indigotin from toluene were discovered by Dr. A. Baeyer in 1880; but they were not commercially profitable. The Farbwerke Hoechst and the Badische Anilin und Soda Fabrik had an agreement to work out the Baeyer processes, and took up the investigation of a new process invented by Carl Heumann in 1890, using benzene and naphthalene as starting-points.

Before the technical development of Heumann's method had been brought to a successful result, the Farbwerke Hoechst succeeded in perfecting a method for the commercial application of Baeyer's orthonitro-benzaldehyde process, and commenced the commercial manufacture of synthetic indigo by this process in 1896; and shortly afterwards the Badische Anilin und Soda Fabrik the manufacture of indigo by Heumann's process. The Société Chimique des Usines du Rhône," in Lyons, having at the same time succeeded in producing orthonitro-benzaldehyde cheaply, began also to produce indigo on a commercial scale.

While the commercial manufacture of indigo was now fully established, the most promising method—that of its production from benzene, as indicated by Heumann—was still impracticable, on account of the unsatisfactory yields. A German chemist, Pfluger, discovered that the addition of sodium amide increased the yield sufficiently to make Heumann's process the most satisfactory and successful method for the synthetic production of indigo; and it is this process that is now generally used.

The cost of production of indigotin, or indigo, as it is commonly known, has decreased so rapidly that the natural indigo trade has suffered a severe decline; and the Government of India has called into service a number of expert scientists for the purpose of investigating the present state of the industry, and the possibility of improving the conditions caused by the competition of the synthetic product with the natural. The synthetic product is now almost exclusively employed by the large manufacturing countries of the world.

While the manufacturers were developing the coal-tar dyestuff in the way shown, they were not idle in other lines, as the list of medicinal chemicals derived from tar shows. Some of the older ones—as antipyrin, acetanilide, and phenacetin—have become so popular as to claim even the attention to the United States Government; but these are only a few of the total number. All this is undoubtedly due to the effect of the services rendered by the chemist, as the number of products and their improvement so constantly and consistently shown in their manufacture indicate a corresponding increase in the scientific and practical knowledge of the subject. That this is recognized by the manufacturers is shown by the number of chemists employed; some of the larger works in Germany having 200 and more on their staff.

Opposition to the Government Coal Bill.

The reports given in recent issues of the "JOURNAL" of the proceedings at the meetings of the Provincial Gas Companies show that Directors of these undertakings are fully alive to the effect of the passing of the Coal Mines (Eight Hours) Bill. But, if this is not to take place, active measures must be adopted to secure sufficient opposition to the Bill in the House. The Directors of some companies have recognized this, and have freely circularized shareholders. Others, however, have merely sent letters of protest to the local Members of Parliament; while several have done absolutely nothing. Now, unless there is the most active co-operation on the part of all concerned, it is unreasonable to believe that the opposition to the measure can be successful. Gas consumers should be urged to point out to their parliamentary representatives that, both in this capacity and as private consumers of coal, they will be seriously affected by the Government Bill becoming law, as the result would be to add materially to the cost of coal (already high), and consequently increase the price of gas, without conferring any corresponding benefit upon the community in general or the miner in particular. For these reasons, it could well be suggested, the Bill should be opposed. No time is to be lost, as the Home Secretary told Mr. Enoch Edwards not long ago that the second reading would be taken before Easter. In support of the statement that the price of coal will rise should the Bill pass, some correspondents of "The Times" quote the following clause from a leading colliery company's form of contract for the future delivery of coal which has been forwarded to them for consideration: "In the event of there being any legislative restriction of the working hours underground in mines, the above fixed prices shall only continue until such time as the Act limiting the working hours comes into operation, after which they shall be increased by 1s. 6d. per ton during the remainder of the contract period." There is no ambiguity about this announcement; and it should be sufficient to rouse into action all who will be seriously affected by it.

A NEW PRESSURE GAUGE.

At the meeting of the Rhenish and Westphalian Association of Gas, Electricity, and Water Engineers held at Remagen last autumn, a paper was read by Herr Lux, of Ludwigshafen, describing, according to the "Journal für Gasbeleuchtung," a new form of pressure gauge, which the author claimed to be more easily read from a distance than the conventional U-shaped gauges regularly employed on gas-works.

As shown by the annexed sketch, the apparatus consists of three concentric glass tubes; the innermost being connected with the pipe or vessel where the positive or negative pressure has to be measured, while the middle is the liquid reservoir. The diameter of this middle tube is much larger than the breadth of the annulus between it and the outermost tube, so that the movements of the liquid in the reservoir are considerably magnified in the outer space. If all three tubes are made of transparent glass, the descent or ascent of the coloured water in the reservoir is apt to mask its ascent or descent in the outer tube, and therefore Herr Lux prefers to construct the centre tube—or, at least, that part whereabouts the liquid rises and falls—of obscured or opalized glass. Made in this way, with the outside tube about 1¼ inches in diameter, the readings are very distinct, and can be seen from a greater distance than is usually possible with gauges of the ordinary pattern. Graduations are etched upon the outside glass of the instrument. A rubber ring can also be slipped round the gauge at the level of the zero point, and, if desired, a second ring at the position of maximum permissible pressure, so as further to increase the conspicuousness of the readings.

RECOVERING PURE HYDROGEN FROM WATER GAS

In the "JOURNAL" for April 2 of last year (p. 33), a short description was published of a patent then recently taken out by Dr. Adolph Frank, of Charlottenburg, for the production of pure hydrogen from water gas. Further particulars on the subject were given (according to the "Journal für Gasbeleuchtung") on behalf of the inventors in a paper read by Dr. Frank before the annual meeting of the German Association of "Naturforscher und Aerzte" held last autumn, an account of which may prove of interest.

The early experiments carried out by the author and his colleagues were instituted with the object of discovering a process for the preparation of crystalline carbon by heating calcium carbide in a current of carbon monoxide; ordinary water gas being employed as the immediate source of the latter. The experiments failed of their primary object, but showed that the residual gas, after passing over the carbide, was essentially pure hydrogen. In view of the importance now attached to the production of pure hydrogen for the popular purpose of filling military balloons, and for the more important commercial purpose of the autogenous soldering of metals, attempts were made to modify the process so as to render the hydrogen the main product. Calcium carbide being somewhat expensive, it was also desired to economize the consumption of the latter.

Actual water gas may be said to contain 5 per cent. of carbon dioxide, 4·5 per cent. of nitrogen, 0·5 per cent. of oxygen, and 40 per cent. of carbon monoxide, mixed with 50 per cent. of the hydrogen which it is desired to isolate. At first the experiment was tried of passing water gas through cuprous chloride; but it gave a hydrogen still containing 20 per cent. of other constituents, and therefore insufficiently pure for the purposes in view. An improvement was effected through the simultaneous removal of the carbon dioxide in a lime washer, the hydrogen then having a purity of about 89 per cent. When this gas was passed over red-hot calcium carbide in a state of powder, the hydrogen contained only from 0·4 to 1 per cent. of other substances. The result was technically satisfactory; but it was foreseen that the washing processes and the regeneration of the cuprous chloride would be troublesome on a large scale. The inventors therefore proceeded to try removing the bulk of the nitrogen and the carbon monoxide by treating the water gas in a Linde liquid air apparatus, finally purifying the hydrogen over carbide, as before. Since liquefied carbon monoxide boils at about the same temperature (that is at −190° C.) as liquid nitrogen, whereas the boiling point of hydrogen is −253° C., the separation of the gases proceeded smoothly, and the whole process was found to work well, the cost of the energy used being at least theoretically recoverable by exploding the carbon monoxide in a gas-engine.

With the idea of exhibiting the process to the military authorities and others, an experimental plant having all the adjuncts required for working on a commercial scale has accordingly been erected at Professor von Linde's laboratory at Höllriegelsreuth, near Munich. The apparatus is capable of producing about 350 cubic feet of hydrogen per hour—a volume sufficient to fill three military balloons per day. One water-gas generator is found large enough to supply all the gas required; so that the installation occupies very little space, and does not need very much attention. As the only raw materials required are coke and a small quantity of carbide for the final purification of the hydrogen, this system of producing hydrogen should, in the author's opinion, be very suitable for employment in beleaguered cities. At present some small difficulty remains whenever the original water gas contains carbon disulphide, as this constituent tends to injure the compressors of the cooling plant. But the inventors hope to obviate the trouble at no distant date.

In his actual address, Professor Frank went on to describe the uses of hydrogen, more particularly for the purpose of autogenous soldering. He pointed out that the hydrogen should always be present in a small excess in the flame; otherwise the oxygen was liable to form a layer of oxide on the metal, which interfered with the success of the joint. He added that whereas a cubic metre of a mixture of hydrogen with the necessary proportion of oxygen only evolved 1730 large calories on combustion, a cubic metre of the similar explosive mixture of acetylene with its equivalent proportion of oxygen evolved 3824 calories. But, nevertheless, many practical engineers preferred the oxy-hydrogen flame, especially for the soldering of sheet iron less than 12 mm. in thickness, because an excess of acetylene in the oxy-acetylene flame was liable to carburize the iron, and so to alter its structure and composition.

Sir George Livesey will preside next Tuesday at the 106th distribution of certificates at the Crystal Palace in connection with the Crystal Palace School of Practical Engineering.

Dr. Hugh Robert Mill, President of the Royal Meteorological Society, and Editor of "British Rainfall," has been elected an honorary member of the Association of Water Engineers.

"Power Gas Producers: Their Design and Application," is the title of a work just published [price 10s. 6d. net] from the pen of Mr. Philip W. Robson, formerly Vice-Principal of the Municipal School of Technology, Manchester.

At the annual meeting of the Manchester Section of the Society of Chemical Industry at the Grand Hotel last Friday evening, Mr. Raymond Ross, F.I.C., F.C.S., exhibited and explained a new type of gas analysis apparatus, about 4 feet in height, in which mercury was used both above and below the gas to prevent contamination or escape. He stated that he had made many experiments, and found the apparatus thoroughly reliable and easy to manipulate.

We have received from Messrs. John Wright and Co. an attractive booklet illustrating the features of the new goods they are sending out for the coming summer season. They comprise new designs of double and treble cooking-ranges, a slot cooker on a stand, a griller and a hot-plate with side burners, a remodelled form of the "Sun" automatic gas-heated boiler, the "Essex" low-pressure boiler, a carving-table, a central range, and a soup-boiler. Outside the range of domestic gas appliances, attention may be called to their new departure in confectioners' ovens for high-class pastry, confectionery work, and bread-making. It is claimed for this oven, which is called the "Victor," and is illustrated in another part of the "JOURNAL," that its heat is absolutely uniform, and at all times under perfect control; and as it is conducted round the oven by specially arranged flues, no products of combustion can come into contact with the pastry. Other qualities claimed for this appliance are rapidity of output and uniformity of results.

At a meeting of the Glasgow Corporation last Thursday, the Town Clerk read a letter from Mr. R. M. Mitchell resigning his seat as a representative of the Kelvinside Ward of the city. The resignation, it was stated, was made purely for reasons of health. Mr. Mitchell has been a member of the Town Council since 1884. In 1891 he was appointed a member of the Gas Committee; his intimate knowledge of the coal trade making him a valuable member, He was appointed as Convener of the Committee in 1895, and held the position till 1904. In 1905, the office of Lord Provost becoming vacant in the November following, and the custom of the Corporation of Glasgow being to informally select the succeeding Lord Provost on the occasion of the inspection of the city water-works in the summer, Mr. Mitchell was nominated and approved by a majority of the Council. After the November election, however, he failed to secure election; the present Lord Provost (Sir William Bilsland) being preferred. With characteristic equanimity, it is reported, and disregard of personal considerations, Mr. Mitchell acquiesced in the decision, and continued to serve the citizens faithfully, though, to the regret of his friends, his health has, for some time, been unsatisfactory. In Mr. Mitchell's time, as Convener of the Gas Committee, the scheme for the erection of the Provan works was conceived, and their erection was completed. At the meeting of the Town Council on Thursday, the Lord Provost said they received with deep regret the intimation of Mr. Mitchell's resignation. He was glad to think that, though three years ago they were in the position of having been keen rivals, this never in the slightest degree affected their friendship. The resignation does not take effect for some weeks; and Mr. Mitchell may have an opportunity of bidding a more formal good-bye to his colleagues.

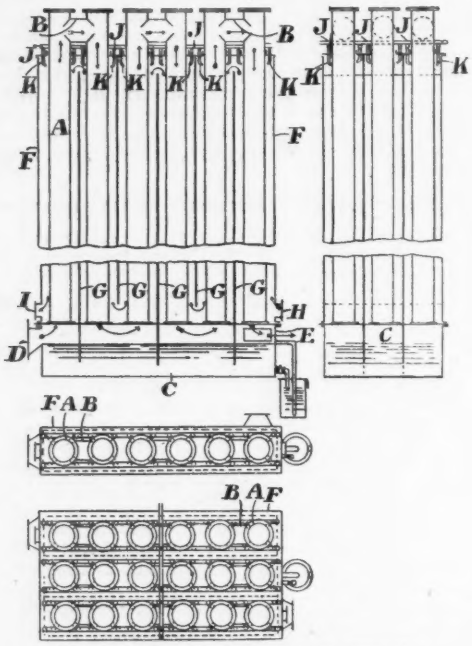
REGISTER OF PATENTS.

Utilizing Waste Heat of the Gases from Producers.

ROWAN, F. J., of Glasgow, and R. & J. DEMPSTER, LIMITED, of Manchester.

No. 3138; Feb. 8, 1907.

This invention has for its object to recover and utilize the heat given off by the gases and vapours from gas-producers, when these gases and vapours are being cooled down to atmospheric temperature, in order to obtain ammonia and tar from them. It is not intended to apply to heat interchangers, otherwise called air heaters or superheaters, which also act as dust catchers, and which are usually coupled up to the gas-outlets of producers and placed in their immediate neighbourhood, and in which some of the sensible heat of the outflowing gases is transferred to the air, or mixture of air and steam, passing to the producer to be used as blast.



Rowan and Dempster's Condensing Apparatus.

In the illustration appear side sectional elevations (at right angles to each other) showing a structure of pipes and fittings enclosed in a fluid-tight casing to carry out the present improvements; a plan view showing a single row of pipes enclosed in a fluid-tight casing; and a similar view showing a battery of three such parallel rows of pipes.

The pipes A (preferably about half-a-dozen set vertically in parallel rows) are placed close to each other. Tar or liquid collecting boxes C would be fitted at the lower ends of the pipes, which would be connected at their upper ends in pairs by coupling ducts B; so that the gas which passes through the inlet and outlet branches D E respectively will flow freely in its transit through the coupled-up series of pipes, as indicated by the arrows. A fluid-tight casing F is constructed to enclose each row, or any desired number of rows or groups, of pipes. Among the pipes (preferably between each pipe or between each transverse row of pipes) are erected baffle or division plates or walls G, projecting in alternate sequence from the tar-collecting vessels at the bottom to near the top of the gas-pipes, and from the enclosed casing near the top of the pipes down to near the upper surfaces of the tar-boxes. In the continuous channel thus formed, a blast of air, produced by a fan or injector, is made to continuously flow, at any desired pressure, preferably in the opposite direction to that of the flow of the gas, from the air inlet H to the outlet I, and so gets heated by the heat conveyed from the gas passing through the pipes which the air-channel surrounds.

Water or liquid pipes J are led at the top of, or through the upper part of, the structure with a series of branches, jets, or nozzles K distributing the liquid over some or all of the pipes A, or a perforated ring branch or like distributor leads to each gas-pipe, so as to make the water trickle down the outer surfaces of the pipes and raise heated vapour within the air flowing passages between the baffle-plates G. By this means, the heated air current will carry away with it the vapour or steam produced by the water around the gas-cooling pipes, so that it can then be used as a producer blast.

Incandescent Gas-Burners.

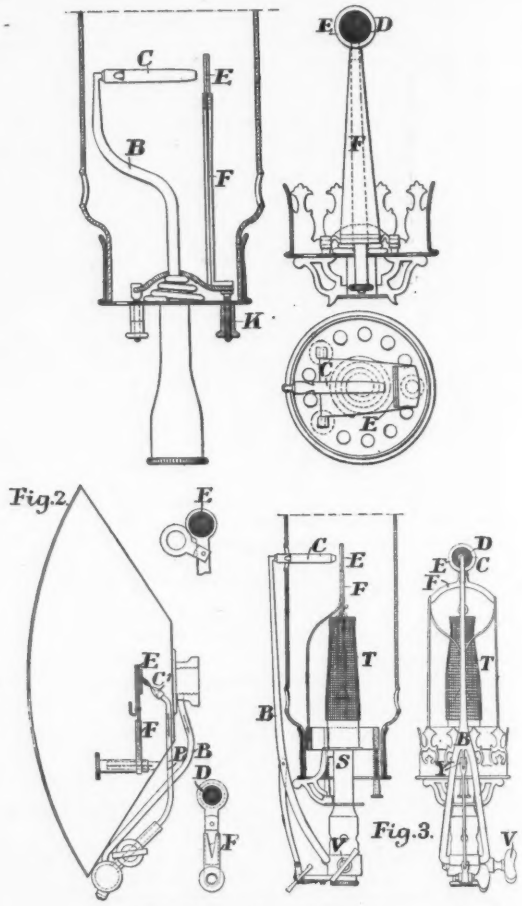
GALILÉ, J., of Nancy, France.

No. 5135; March 2, 1907.

In the words of the patentee, it has been proposed to provide incandescent gas-burners of high intensity with a flat body or disc adapted to be rendered incandescent by a flame impinging on it, and so mounted as to be adjustable in regard to its distance from the flame.

The present invention has for its object to provide an incandescent gas-burner (specially adapted for use as a night-light) in which the incandescible body can be adjusted not only in regard to its distance from the flame, but also in its own plane, so that the flame may impinge centrally thereon. In this way, an unflickering light is said to be obtained, "as the body is rendered uniformly incandescent, and the maximum intensity of light is obtained for an insignificant consumption of gas."

A burner constructed in accordance with this invention comprises: An atmospheric burner, preferably of exceedingly reduced dimensions, giving a very small and hardly visible flame; and a disc of gauze, impregnated with oxides of rare earths, disposed opposite the atmospheric burner and at a shorter distance from it, and arranged in a frame so mounted that the position of the disc can be regulated not only in regard to its distance from the burner, but also in regard to its centrality.



Galile's Incandescent Burners.

In fig. 1, the base of the burner is prolonged in the form of a tube B, re-curved, and terminated by an atmospheric burner C of small consumption, emitting a short flame. Opposite it is placed a disc of incandescent gauze D (preferably circular), retained in a mount or frame E held in place in a support. In order to regulate the position of the disc relatively to the burner, this support is mounted upon a platform having a screw K, which permits of the disc being adjusted so as to directly face the burner. A spring M, below the platform, tends constantly to raise the latter in such manner that the frame E is caused to approach or recede from the burner. With this arrangement, the flame emitted by the burner C plays upon the refractory disc D, which becomes incandescent and provides illumination, sufficient for a night-light with an insignificant consumption of gas.

In the modification shown in fig. 2, the incandescent gauze disc D is held in a mount constituted by two annular members, one of which is provided with a recess for the reception of the disc, and one movable upon the other about an axis in such manner that, by simply displacing one portion from in front of the other, the incandescent gauze disc may at once be put in place or removed. The gas flows by way of the pipe B, branched upon the burner union and terminating in a nipple having "a very small orifice adapted to emit a strong but thin jet of gas producing a very hot flame rich in oxygen." On a pipe B are provided a tap and a small reservoir for collecting the water of condensation, and provided with an emptying screw-plug. This arrangement may be utilized either as a wall lamp or as a ceiling lamp; in the latter case, the jet of gas being let in from below, and the disc carrier being placed a little farther down the apparatus.

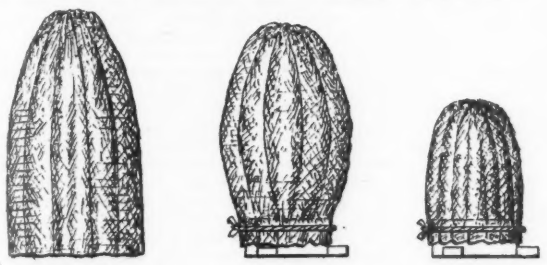
In fig. 3, the burner described above with reference to fig. 1 is shown in combination with an ordinary incandescent burner of the Auer type. With this arrangement, if the tap V be opened to admit the gas to the burners S and C, the ordinary mantle T is illuminated at the same time as the night-light E; but if the tap be turned so as to close the main burner, the tube B of the night-light will remain open, and the illuminating disc D will continue to furnish a sufficient light while permitting the re-ignition of the burner S at will. This device is applicable in many cases—"more particularly when it is desired to have a reduced light with an incandescent burner, as is frequently the case, for example, in such places as staircases, corridors, hospital wards, and the like."

Illuminant Appliances for Gas-Burners.

CALVERT, G., of Stoke Newington, N.

No. 5400; March 6, 1907.

According to this invention, mantles of the corrugated type, having one end closed, are produced by forming corrugations, ribs, or indentation, in or upon the surface of the unburnt mantle or prepared fabric of which such mantles are made always before the incineration takes place. The patentee proposes to form in the fabric or substance (always before incineration) grooves or ridges or indentations and excrescences or corrugations (or any combination thereof), arranged in any suitable way, and then incinerating the fabric or substance. In addition to admitting of greater freedom in the expansion and contraction of the mantle, it is claimed that this construction braces the mantle or renders it stiffer and more able to resist shocks or blows, &c.



Calvert's Ridged Mantles.

The arrangement found to best suit the purpose is to make the mantle of corrugated form, or with grooves and ridges running in the direction of the length of the mantle—*i.e.*, running from the apex to the opposite end or base—such corrugations running longitudinally part or whole of the length of the mantle. This arrangement admits of a very large increase in surface area without any appreciable increase in cubic capacity—*i.e.*, of the space enclosed by the corrugated mantle—and, consequently, without requiring any increased flame.

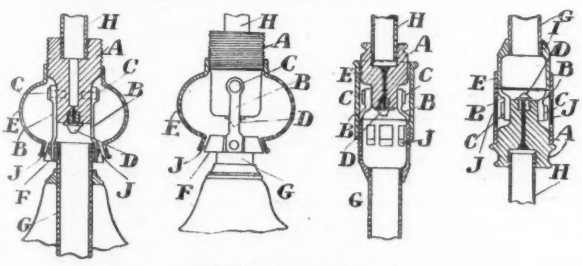
The illustration shows the mantle (before incineration) after having been subjected to, and shaped by, the process; the mantle attached to a magnesia ring; and the completed mantle, after incineration.

Bunsen Burners.

HELPS, GEORGE, of Nuneaton.

No. 5700; March 9, 1907.

This invention of improvements in bunsen burners (particularly in connection with incandescent gas lighting) consists in a hinged attachment to the gas-nipple block of the burner so that when it is required to change or clean the nipple the burner may be swung aside and the nipple changed, removed, or cleaned without disconnecting the burner. It is particularly suitable for inverted burners, in which case the burner-tube may be suspended from the nipple block by two loose cheek-pieces secured by pins on which they turn. The air adjustment may be made by fitting over the cheek-pieces, let into the burner-tube and nipple block, a screwed or sliding sleeve by which provision is made for regulating the air, or the sleeve may be perforated itself for the admission of air direct. In this latter case, before the burner can be swung back, the screwed sleeve would have to be run up or down, so as to give clearance for the hinge to work.



Helps's Bunsen Burners.

The first and second illustrations show the nipple block A, to which the hinged cheek-pieces B are secured by pins C, and on which they can turn freely. The other ends of the cheek-pieces are rigidly secured to the burner. D is the gas-nipple; E, the screwed sleeve, which, with the conical ring F, regulates the air; G, the burner-tube; and H, the gas connection. J are air inlets.

In the third illustration, the cheek-pieces are attached to the air cone of the burner; while the fourth illustration shows the arrangement for a vertical burner, with a sliding perforated sleeve for the admission of air to the burner.

Prepayment Mechanism for Electric and Gas Meters.

BOWDEN, J. H., of Poplar, E., ROBINSON, J. A., of Ealing, W., and JACKS, A. H., of Leytonstone, Essex.

No. 6006; March 12, 1907.

This invention relates to mechanism by which a predetermined supply of electric current or of gas may be obtained by the insertion of a coin or coins of proportionate value into a slot in the electric or gas meter.

The way of applying the invention to a meter for measuring and indicating electric current is given as an example. In order to ensure that the meter shall allow the passage of that amount of current only which is represented by the value of the coins inserted into the apparatus by the consumer from time to time, it is arranged that, upon the insertion of a coin, it enters a receptacle capable of being rotated by the consumer from the exterior of the meter. The rotation of this receptacle causes the coin to project a driver, pin, or other suitable device; and in this projected position the pin acts upon a lever carrying a pawl and moves the lever and pawl through a certain portion of a circle, and then releases them to the action of a spring which returns them into their normal position—the further rotation of the coin receptacle allowing the coin to fall, but being otherwise inoperative until another coin is inserted therein. The engagement of the driver pin with the lever causes the pawl thereon to engage with a toothed wheel in gear with the ordinary arrangement of a counter-train of wheels, but provided with a friction device to enable it to be turned independently of the counter-train. This toothed wheel is therefore moved by the lever and pawl (the counter-train of wheels remaining stationary) for part of a revolution proportionate to the traverse of the lever and pawl; and this partial rotation of the wheel suddenly brings an oscillating or travelling switch into sliding contact with an annular contact-plate, which may form the greater part of a circle, but is arranged with a gap at one part, and the travelling switch is left in position on this annular plate. If a second coin be now inserted and the coin receptacle rotated as before, the operation of the various parts would be repeated, but the travelling switch would be moved further round the annular plate; each such movement of the switch being cumulative. Current will now pass through the meter, and the counter-train will gradually rotate the toothed wheel in the opposite direction to that in which it had previously been rotated by the action of the lever and pawl. During this return movement of the toothed wheel, a pin or projection on it engages with the travelling switch and causes it to retrace its path over the annular contact-plate until it reaches the gap before referred to, when it suddenly leaves the annular plate; its movement being accelerated at this point by a spring, and arcing is thereby prevented as much as possible. No more current will pass through the meter until another coin is inserted.

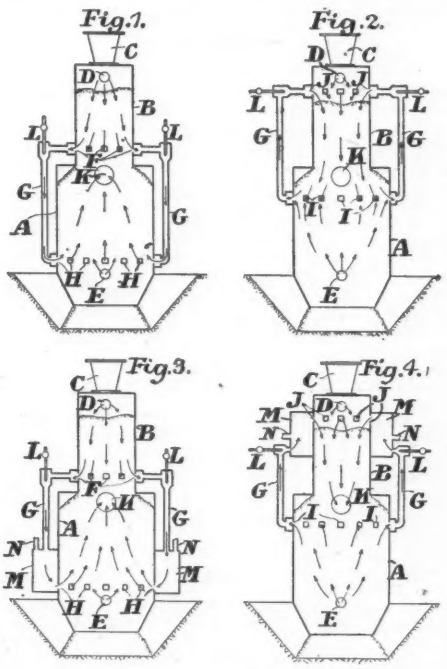
It is obvious that in the application of the mechanism to a gas-meter, a valve opening and closing device would only need to be substituted for the electrical contact making and breaking devices described.

Operating Gas-Producers.

LYMN, A. H., of Bromley, Kent, and WEIL, J. A., of Bow, E.

No. 6491; March 18, 1907.

Many attempts have, the patentees observe, been made to operate a gas-producer in such a manner that the gas produced shall be free from tar; and their invention relates to a method of operating a producer



Lymn and Weil's Gas-Producers.

with this object in view. The type of producer employed is that in which the blast is admitted in part at the top (the producer being either of the pressure or suction type) and in part at the bottom; the outlet for the gas produced being between the blast inlets—preferably above the middle of the height of the producer. The top blast is downwardly directed; and the gases and vapours it produces are wholly or in part diverted into the lower portion of the producer, so that they must ascend through the hottest zone before they arrive at the outlet. In this case, the gases and vapours produced by the bottom ascending blast pass directly to the outlet. As an alternative, the products of the downwardly directed blast may pass directly to the outlet, and those of the upwardly directed blast may be wholly or in part suitably conducted or diverted so that they pass into the upper part of the producer at or near the place where the downward blast is admitted, and then pass downwards to the outlet. In either case, the products which pass from one part of the producer into the other may

receive a supply of air on their way; so that the tarry matters are wholly or partially burnt independently of the main top or bottom blast.

The preferred form of producer consists of a coking chamber fixed above, and preferably of smaller capacity than, the producer proper. The gas-outlet is below the bottom of the chamber, but substantially at the top of the producer proper.

For the first mode of working, one or more channels are provided within or outside the producer for conveying the products of the coking-chamber into the lower part of the producer; and when these products are to receive a supply of air, they may pass through a chamber or an enlargement of the producer in their course, to which the necessary air is admitted. The chamber may also play the part of a steam generator furnace. The arrangements are similar for the second mode of working—that is to say, there are suitable passages within or outside the producer for conducting the products from the top half of the producer proper to the coking-chamber, preferably to the space above the fuel of the latter. Diverting devices may be provided within the producer or coking-chamber, or both, for directing the course of the products.

Four diagrams representing producers suitable for this method of operating are shown in the specification.

Referring to fig. 1, the producer consists of a steel body A (preferably cylindrical), lined with refractory material and surmounted by a steel shell B—called the coking-chamber—preferably of small diameter and also lined with refractory material. The fuel is supplied through the hopper C, and the blast of air or air and steam (superheated or not) is supplied at the top of the coking-chamber by the pipe D, and at the bottom of the producer by the pipe E. Part or the whole of the gases and vapours from the coking-chamber are drawn off through ports F, and conducted through channels G (outside the producer) to ports H, from which they ascend through the incandescent fuel to the outlet K. Steam jets L may be used for forwarding the products from one part of the producer to the other.

In the modification shown in fig. 2, the gases and vapours are drawn off through ports I situated in the upper part of the producer proper, and are delivered through channels G into the top of the coking-chamber through ports K.

Fig. 3 shows the application of a combustion chamber M for the complete or partial combustion of the products on their way from the coking-chamber to the producer proper. The air or air and steam necessary for this combustion may be supplied through pipes N; and if the combustion in M is to be complete, the air or air and steam supplied may be sufficient in quantity to render the blast at E unnecessary.

Fig. 4 shows the arrangement when the combustion chamber M is applied to the producer in fig. 2. In this case also the air or air and steam, supplied through pipes N, may be more than sufficient to burn the whole of the gases and vapours passing through the chamber M; thus rendering the blast at D unnecessary.

APPLICATIONS FOR LETTERS PATENT.

6231.—Hooper, H. C., "Carburetting light hydrocarbons for light, heat, or power." March 20.

6243.—Teasdale, C. R., Le Maitre, W. L., and Greaves, E., "Suction gas plant." March 20.

6250.—Hicks, J. A., "Production of gas from light hydrocarbons." March 20.

6251.—Ries, H., "Quenching and discharging of coke." March 20.

6278.—Essex, E. H., "Calculating the velocity of flow and rate of discharge of water or other fluid in pipes." March 20.

6306.—Tweedie, R. O., "Incandescent gas-lamps." March 21.

6317.—Blamire, T., "Bunsen burner." March 21.

6330.—Dolleymore, R. S., "Packing mantles." March 21.

6347.—Vignon, L., "Production of gas." March 21.

6365.—Chandler, S. & J., "Pendants." March 21.

6445.—Harrison, T. B., "Gas-burners." March 23.

6468.—Finch, P. R., "Mantles." March 23.

6471.—Mundey, S., "Indicating the extinguishing of lamps." March 23.

6495.—Jones, E., and Kynoch, Ltd., "Gas-producers." March 24.

6497.—Adcock, A. H., "Rise-and-fall brackets." March 24.

6567.—Shaw, J. J., "Regulating gas-burners." March 24.

6605.—Morrison, A., "Holding gas-globes." March 25.

6635.—Zappert, E., "Packing mantles." A communication from the Patent Cartonnagen-Fabrik G. m. b. H. March 25.

6662.—Prudon, E. E. L., "Liquid meter." March 25.

6678.—Wakefield, C. C, "Acetylene generators." March 25.

6681.—Dewrance, J., "Reducing valves." March 25.

6763.—Van Zandt, E. G., "Gas-heating apparatus." March 26.

6790.—Brown, T., "Gas-lighting appliances." March 27.

6816.—Meikle, J., and Duncan, H., "Condensing or extraction of tarry or other matter from coal or producer gas." March 27.

6826.—MacDonald, A. E., "Valves." March 27.

6827.—MacDonald, A. E., "Internal combustion engines." March 27.

6856.—Prudor, E. E. L., "Liquid meters." March 27.

The Stockport Trades and Labour Council, and the local branch of the Friendly Society of Ironfounders, wrote to the Gas Committee requesting that in all future contracts for castings the Corporation should furnish the contractors with a stamp to print on the same, as they believed this to be the only way in which the fair contracts clause could be carried through. The Committee resolved that these bodies should be asked to furnish reasons for desiring castings to be stamped with the name of the Corporation, and to give the Committee some examples as to how the suggested stamping would affect the members of the Trades Union. It is argued that if the Corporation were to adopt this system of stamping, the men concerned would know at once whether or not the castings had been made under Trades Union conditions, and would accordingly be in a position to communicate with those in authority.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

High-Temperature v. Low-Temperature Carbonization.

Sir,—So little has been heard lately of the once much vaunted "Coalite," that I, for one, thought the Company had gone the way of other companies which have made a great deal of noise before going to allotment, and very little afterwards, and that it remained only as a painful memory with the unfortunate shareholders. It seems that I was wrong. If the Company are feeling ill, they are not quite dead; and as an eminent consultant has seen the patient, there are still hopes that by his vigorous assistance its feeble life may be prolonged a little. We all know how enthusiastic our friend Professor Lewes can be over any subject in which he is interested. I can assure the worthy Professor that the gas engineers of the country, for whom he has so little respect, are not at all shocked when amateurs, including professors, gravely propose to show them how coal should be carbonized. They are amused.

I do not propose to follow the Professor through all his arguments in support of the Coalite Company's process—that would take far too much of your space; but I must criticize his comparison of the cost of high-temperature as against low-temperature carbonization. First, I must call his attention to some inaccuracies in his figures. In the residuals statement, the price of coke should be 10s. 11·59d., and not 12s. 3d.; and the price of tar should be 1·37d., not 1·5d. per gallon. He admits that high-temperature carbonization results in a yield of 11,000 cubic feet of gas per ton; but in his statement he compares a sale of 10,000 cubic feet per ton with a make of 5000 cubic feet per ton, which is incorrect. In the following comparison, I have taken the figures at per 1000 cubic feet sold in both cases—viz., at 10,000 cubic feet in the case of the high-temperature, and at 4500 cubic feet in the case of low-temperature. Taking the corrected figures, the comparison should be as follows:—

Receipts from One Ton of Coal.

HIGH TEMPERATURE.

	Pence.
Coke	6·11
Tar	1·30
Ammonia	2·11
	9·52 per 1000 c. ft.

9·52d. × 10,000 c. ft. per ton = £0 7 11·2 per ton.
Gas, 10,000 c. ft. at 2s. per 1000 c. ft. . 1 0 0·0 ,,

Total receipts . . . . £1 7 11·2 per ton.

LOW TEMPERATURE.

	Pence.
Coke, 2·4 cwt. at 10s. 11·59d.	15·79
Tar, 4·6 gallons at 1·37d.	6·30
Ammonia	2·80
	24·89 per 1000 c. ft.

* 4500 coal gas } 24·89d. × 4500 c. ft.
1350 water gas } per ton . . = £0 9 4·0 per ton.

Gas, 5850 c. ft. at 2s. per 1000 c. ft.. . 0 11 8·4 ,,

£1 1 0·4 per ton.

Cost of blue water gas—
1350 c. ft. at 3½d. per 1000 c. ft. . 0 0 4·7 ,,

Total receipts . . . . £1 0 7·7 per ton.

High temperature . . . . . £1 7 11·2 per ton.
Low temperature . . . . . 1 0 7·7 ,,

Difference in favour of high temperature £0 7 3·5 per ton.

* In order to make the candle power equal to that of high-temperature gas, 300 cubic feet of blue water gas per 1000 cubic feet has been added: the cost being taken at 3½d. per 1000 cubic feet, as given by Professor Lewes.

This shows a difference of 7s. 3·5d. in favour of high temperature; and this after assuming that when the quantity of coke for sale is increased to three times the present supply and the quantity of tar to four-and-a-half times, the present prices would be maintained—an assumption that no gas engineer, no commercial man, and, I think, only very few professors, would believe.

The Professor also compares the Coalite process carried out with the maximum use of machinery with the working of a company which is by no means fully equipped with labour-saving appliances. This is not fair. In comparing the two systems, he should take the best that can be done in each. The manufacturing wages in some works which are fully equipped with machinery are as low as 1·33d. per 1000 cubic feet; and Herr Körting states that at Dessau, where vertical retorts are installed, it is only 0·5d. per 1000 cubic feet.

With regard to "maintenance," Professor Lewes assumes that the low-temperature cost will be only one-fourth of the high, because of the lower heat of the retorts. This may be so with regard to the retorts, which, however, form only a part of the maintenance charges. On the other hand, the cost of dealing with the largely increased quantities of coal, coke, and tar would more than counterbalance the saving. It is, therefore, more than doubtful whether, compared with the best example of high-temperature plant, there would be any saving in the cost of wages and maintenance per ton of coal, while the cost per 1000 cubic feet would, of course, be much more. Professor Lewes's estimate of the cost of maintenance under the Coalite system is purely speculative, for there has not been sufficient time to test it.

There is much in the remainder of the lecture which invites criticism; but I think I have said enough to prove that the Professor who "gravely proposes" to double the coal consumption of the gas industry, treble

the output of coke, and quadruple the production of tar, and would have us believe that this would not affect prejudicially the prices of these materials, has, to say the least, allowed his enthusiasm for this "protected" method of coal carbonization to get the better of his judgment.

SYDNEY Y. SHOUBRIDGE.

South Suburban Gas-Works,
Lower Sydenham, April 2, 1908.

Surveyor as Gas Engineer.

SIR,—In your issue of the 24th ult., you regaled your readers with an article under the heading "Surveyor as Gas Engineer," in which article my name prominently figures among statements made calculated to damage. The remarks and inferences in the article in question are incorrect and untrue in the main features, and have undoubtedly proceeded from a source with an "axe" of its own "to grind." I am sorry, Sir, that a journal of your standing should so readily lend itself to such service without having more precise information to hand.

Two charges are made: 1. That as an Engineer (or rather Surveyor) I have asked manufacturers for particulars that an Engineer (or rather Surveyor) has no right to ask. 2. That I am incompetent to carry out the work entrusted to me.

In regard to the first point, I have to thank the makers of gas plant and appliances for the readiness with which they have acceded to my request, and furnished me with trade catalogues and particulars of appliances and plant made by them—particulars which would usually, and ordinarily, be supplied to any private firm or individual who might make application for the specialities of a firm in the ordinary way of business. Am I to understand, Sir, that the up-to-date gas engineer and manager referred to by you is such a superior person that—in designing new works, or making alterations—he can dispense with the valuable information contained in trade catalogues which are so readily supplied by manufacturers who have made a particular branch a speciality and have designed the most up-to-date plants on the market? Does your young gas engineer design the whole of the plant that he intends installing in his works? It has indeed come to a fine pass if an Engineer (or Surveyor) is debarred from asking manufacturers for ordinary trade particulars which I venture to say have up to the present been rightly looked upon as one of the ordinary sources of information.

The whole thing is too ridiculous for words, and the up-to-date gas engineer and manager who can afford to ignore or consider the best productions and specialities of up-to-date manufacturers is indeed a curiosity. Had I asked for plans, specifications, and estimates for structures and plant, the case would have been different—this being work which would *find work for the drawing and estimating departments of the makers.* Such was not my request. The suggestion you make that *it would be cheaper to place the entire contract with one firm* (and that my firm) is probably what the instigator of the article would prefer. But my Council are not particularly anxious to be thus bound.

Second, in regard to my competency to carry out the work required by the Council as their Engineer and Surveyor. My qualifications and abilities are sufficiently known to be appreciated. The present appointment is not the first where I have executed work in connection with the gas undertaking, and I certainly should not have been called upon to execute it had the gas engineer or manager been better able and more competent than myself to carry it out.

In the present instance, it may interest your readers to know that my Council have had the expert advice of a well-known Consulting Gas Engineer; and should they require further advice to enable them to design and plan the extensions in an up-to-date manner, I am sure they will not be slow at availing themselves of it. In the meantime, the irate one will be better employed by writing his own name in print rather than mine; for I am sure my Council are in no frame of mind to be dictated to by the "hand in the dark" whose motive I am convinced is not the interest of the gas industry, but personal.

JOHN W. LIVERSEDGE, Assoc.M.Inst.C.E.,
Engineer and Surveyor to the Council.

Leigh-on-Sea, April 2, 1908.

[The article of which Mr. Liversedge complains was directed to a matter of policy, and was written in the cause of professional defence, the arguments being as applicable to the profession of surveyors as to that of gas engineering. No doubt Mr. Liversedge has seen, as we have done, some deplorable results from the excursions of professional men into fields with which they have little or no acquaintance. It is noted with interest that, though the Leigh-on-Sea Council have a Surveyor and Engineer in the person of Mr. Liversedge and a Manager at the gas-works, they "have had the expert advice of a well-known Consulting Gas Engineer;" but it does not appear from our correspondent's letter that they have sought that advice on this occasion when they are carrying out, for Leigh-on-Sea, fairly considerable extensions of the works. If Mr. Liversedge's sole object in originally addressing manufacturers was to ask for catalogues (numbers of which have no doubt been addressed to Leigh-on-Sea, as to other places, without the asking), a simple request would have sufficed. If that was his modest intention, he used many words in the effort to make it clear; and, in using them, unfortunately omitted all mention of a catalogue. The reproduction of his circular-letter will enable readers to judge for themselves what he required. Here it is:

Surveyor's Department, Council Offices,
Leigh-on-Sea.

Dear Sir,—My Council have given me instructions to prepare plans and specifications for certain extensions to their gas-works. Such extensions include new retort-house, with chimney and coal-store, additional retorts regenerative type, engine and exhauster, condensers, scrubber, and two-lift gas-holder and tank. Provision is being made for an annual make of 47 million cubic feet, with a maximum daily send-out of 200,000 cubic feet, and hourly send-out 20,000 cubic feet.

The question of plant and appliances is now under my consideration; and as you are makers of gas plant, I should be obliged for your particulars in regard to all or any of the following:

Hauling and coal weighing appliances—coal to be discharged from barge alongside, and deposited direct into retort-house or store immediately adjoining.

Retort-house, general ironwork.

Retorts—provision of four settings.

Gasholder and tank, 60 feet diameter, in two lifts, about 160,000 cubic feet (as to tank construction in ferro concrete, if carried out by you).

Gas-engine and exhauster, condensers, and tower scrubber, with all necessary valves and connections.

(Signed) JOHN W. LIVERSEDGE.

That does not look much like the simple request that Mr. Liversedge suggests as to catalogues, from which to obtain particulars as to works of a specified annual, and maximum daily and hourly, output; nor a mere desire for information as to specialities—particularly is this seen with regard to the gasholder and tank, for the former of which guiding dimensions are given and the method of tank construction is prescribed. As to Mr. Liversedge's competence *as a gas-works engineer*, in the article in question deliberately guarded expressions were used in touching upon such a delicate question; and we will not tread upon the ground now, further than to quote two sentences from Mr. Liversedge's own letter. He says: "The present appointment is not the first where I have executed work in connection with the [presumably the Leigh-on-Sea] gas undertaking;" and (in the succeeding paragraph), "it may interest your readers to know that my Council have had the expert advice of a well-known Consulting Gas Engineer." These sentences suggest something that does not tally with the deep-rooted conviction from a considerable experience that gas engineering and management require a long and special training. Nor does the wording of the letter suggest to us that the Council have had the expert advice of a well-known Consulting Gas Engineer in connection with these extensions. If they have, the Council believe in going to work in a circuitous manner; for now they "have given me," says Mr. Liversedge, "instructions to prepare plans and specifications for certain extensions to their gas-works—such extensions to include," &c. Really it would be waste of time to discuss all the little points raised in our correspondent's letter.—ED. J.G.L.]

Treatment of Ammonia Liquors.

SIR,—As certain important points in connection with my patent No. 19,988 of 1907 [see "JOURNAL" for March 17, p. 710] appear to have been misunderstood, I shall be obliged if you will allow me to explain the principles and the facts upon which my process for the recovery of cyanogen compounds from crude gas liquors is based.

In the crude gases from gas-retorts or coke-ovens, practically all the cyanogen is in the state of hydrocyanic acid or ammonium cyanide. On passing through the washers or scrubbers, these compounds are abstracted as such; so that, when freshly made, crude ammonia liquor contains practically all the cyanogen in the state of ammonium cyanide. The latter, however, on standing and exposure to the air, interacts with the ammonium sulphide present in the liquors, and becomes partly converted into sulphocyanide; and, in similar manner, ferrocyanide may be formed where the ammonium cyanide comes in contact with the iron vessels and pipes. The longer crude ammonia liquors are stored, the more ammonium cyanide will disappear, and its equivalent of sulphocyanide and ferrocyanide will be found in the liquors. This appears very clearly from the Forty-Second Report of the Chief Inspector under the Alkali Acts, Mr. Forbes Carpenter. He found that in gas-works, where the storage capacity is generally great, 75 per cent. of the total cyanogen present in the liquors from the storage wells had been converted into sulphocyanide and ferrocyanide. On the other hand, in coke-oven liquors, which, as a rule, are only stored for a couple of days, only 25 per cent. of the total cyanogen present in the crude liquors had been converted into sulphocyanides, and no ferrocyanide had formed. That this difference is only due to the time of storage and exposure to air, and not to any intrinsic difference between gas-works and coke-oven gases and liquors, is proved by the fact that in a gas-works which had unusually small storage-tanks, 76 per cent. of the total cyanogen was found in the crude liquors as ammonium cyanide.

It is hardly necessary to state that, in the course of a number of experiments made by me on crude ammonia liquors, I have been able to corroborate these facts. Their bearing on my process is obvious. It is well known that ammonium cyanide can be converted into ferrocyanide; and if the crude ammonia liquors are manipulated for this purpose when freshly made, the cyanogen which is then present as ammonium cyanide—*i.e.*, according to Mr. Forbes Carpenter, 75 per cent. of the total cyanogen—will be recoverable as ferrocyanide. The question then arises whether crude ammonia liquors contain sufficient ammonium cyanide when freshly made to render its conversion into ferrocyanide commercially practicable. Here again we find the most valuable data in the Chief Alkali Inspector's reports, which, properly interpreted, show that in many cases, if not in most, the amount of cyanogen present is such as should well repay recovery from the crude liquors as ferrocyanide.

But it must be borne in mind that, in order to judge the feasibility of my process from Mr. Carpenter's figures, the conclusions should be drawn from the amount of total cyanogen present in the liquors, and

not from the amount present as ammonium cyanide; for it is the former amount alone which tells what quantity of ferrocyanide could be obtained if the liquor had been or were treated according to my patent, when freshly made. The average of total cyanogen in crude liquors is, according to the authority quoted, equal to about 1·6 lbs. of yellow prussiate of soda per ton of coal in gas-works, and to 1·3 lbs. in coke-oven works. In the present mode of storing the liquors for a considerable time, less than ½ lb. of prussiate would be obtained in gas-works. But if these liquors were manipulated when freshly made, 1¼ lbs. could be obtained. Nor would there be any difficulty in dealing with them when freshly made, as, after going through my process, they could be stored for any length of time before passing to the stills.

The figures given above, being averages, are naturally made up of the highest and lowest results obtainable; and thus there will be works in which the yield will be considerably more, and others in which it will be less. Taking Mr. Forbes Carpenter's data, I estimate that the amount of yellow prussiate recoverable from crude ammonia liquors will in most gas-works be over 2 lbs. per ton of coal, corresponding to a gross revenue of 7d. per ton of coal. The capital outlay for plant comes to less than 30s. per ton of coal carbonized per day; and the process requires no alteration in the present mode of working, no skilled supervision, and little labour, and should, in most gas-works, yield a net revenue of 5d. per ton of coal, and in coke-works about 4d. per ton of coal.

I am aware that even 2 lbs. of yellow prussiate per ton of coal is considerably less than the quantity that might be obtained by absorbing the cyanogen compounds from the gases; and the question arises why there should be such a discrepancy. The difference is too great to be accounted for by the amount retained in the oxide, even if we make full allowance for the amount destroyed in the revivifying operations. The most probable explanation appears to be that part of the hydrocyanic acid present in the crude gas is converted into carbamate, and finally into carbonate of ammonia in its passage through the scrubbers. If this were the case, it would point to the possibility of a reduced yield in ammonia in those processes which extract the cyanogen compounds from the gases, and would be a further point in favour of dealing with the crude ammonia liquors for this purpose.

I may take this opportunity of mentioning that, as regards my patent No. 7932 of 1907, the cost of treating the effluent in such manner as to render it fit for use in steam-boilers will come to from ¼d. to ⅜d. per ton of coal carbonized. This should not be a prohibitive charge in places in which the waste effluents have become such a nuisance that their emission must be stopped or the works closed.

Plymouth Grove, Manchester, April 4, 1908. J. GROSSMANN.

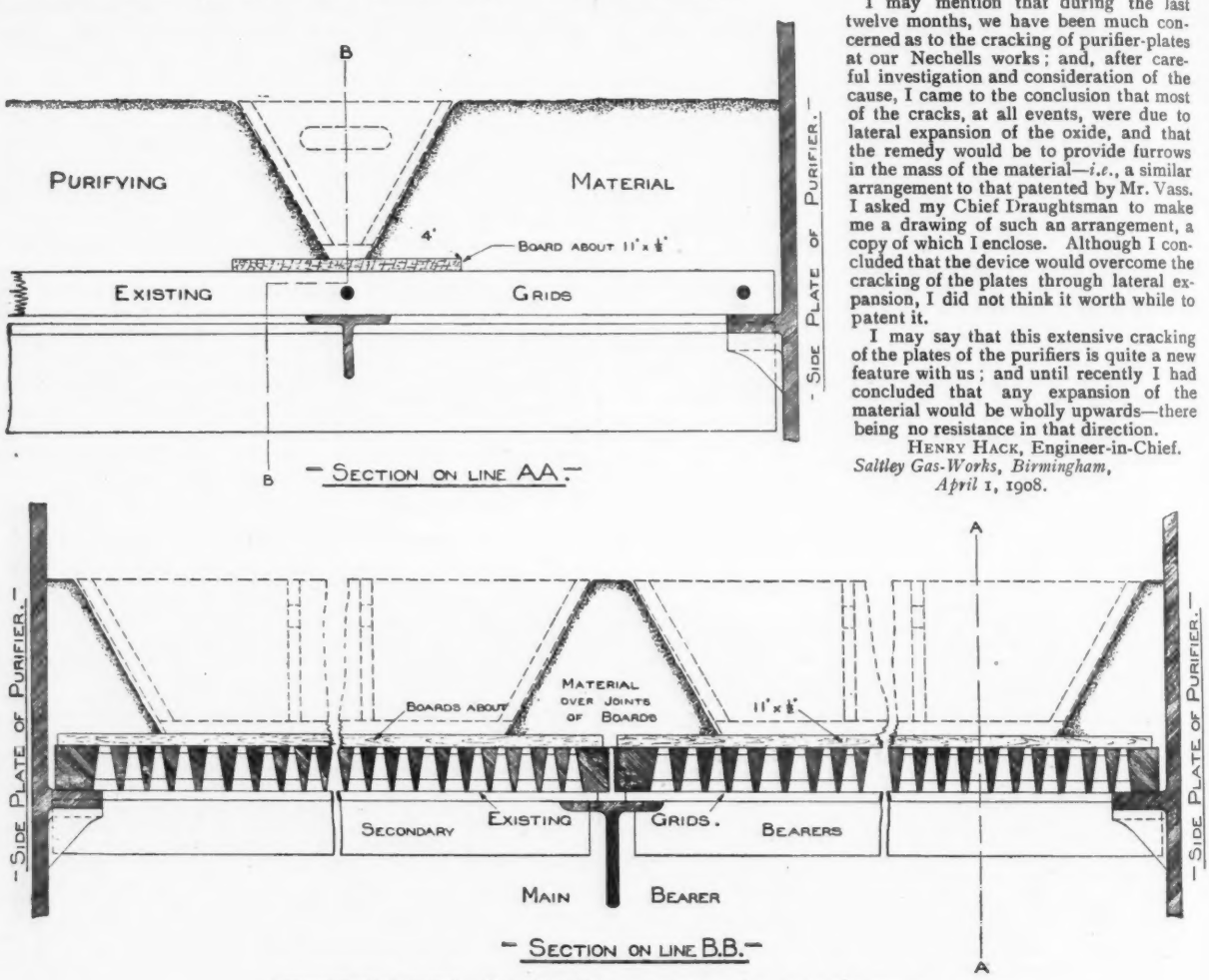
Cracking of Purifier Plates through Expansion of Oxide.

SIR,—Referring to Patent No. 26,032 (Nov. 25, 1907) mentioned in your issue of the 17th ult. (Mr. D. VASS, of Airdrie), this is another instance where two or more persons have thought of practically the same remedy.

I may mention that during the last twelve months, we have been much concerned as to the cracking of purifier-plates at our Nechells works; and, after careful investigation and consideration of the cause, I came to the conclusion that most of the cracks, at all events, were due to lateral expansion of the oxide, and that the remedy would be to provide furrows in the mass of the material—*i.e.*, a similar arrangement to that patented by Mr. Vass. I asked my Chief Draughtsman to make me a drawing of such an arrangement, a copy of which I enclose. Although I concluded that the device would overcome the cracking of the plates through lateral expansion, I did not think it worth while to patent it.

I may say that this extensive cracking of the plates of the purifiers is quite a new feature with us; and until recently I had concluded that any expansion of the material would be wholly upwards—there being no resistance in that direction.

HENRY HACK, Engineer-in-Chief.
Saltley Gas-Works, Birmingham, April 1, 1908.



Arrangement of Purifying Material in Furrows, to Allow of its Lateral Expansion.

[The removable timber templates are shown in dotted lines; and in one direction these templates must not be in greater lengths than 6 ft. 3 in., to permit of their removal between the main bearers.]

Water Filtration at Cowes.—The Cowes Town Council are expending £5450 in providing Candy filters for their water-works; the report of Dr. J. C. Thresh, their expert, being to the effect that such filtration would render the abundant supply of a perfectly wholesome character. For the installation, the borrowing powers to the extent of £6000 were inquired into at a Local Government Board inquiry held at the Cowes Town Hall on Tuesday last, when expert evidence by engineers fully supported Dr. Thresh's report.

New Issues of Gas Capital.—At the Mart, Tokenhouse Yard, E.C., next Tuesday, Mr. Alfred Richards will offer for sale, as already announced, issues of £3000 of 5 per cent. preference stock and £3000 of 4 per cent. perpetual debenture stock for the Directors of the Southgate and District Gas Company; and 400 £10 "B" shares and £2000 of 4 per cent. perpetual debenture stock for the Directors of the Grays and Tilbury Gas Company. On the same occasion, he will submit, for private owners, £500 of 5 per cent. preference stock of the Horley District Gas Company, and 100 £10 "G" ordinary shares in the Aldershot Gas and Water Company.

Sale of Gas Stock.—Messrs. Hollis and Webb last Tuesday sold by auction £210 of Mirfield Gas Company's stock, at £110 10s. per cent.

Lamp-Kicking as a Sport.—At the Eastbourne Borough Police Court a boy of fourteen was summoned by the Corporation for wilfully damaging three street gas mantles and an automatic controller and wasting a quantity of gas; the extent of the damage being 1s. The Town Clerk (Mr. H. W. Fovargue) explained that the damage was caused by the defendant kicking several street lamps. There were a number of boys who seemed to think it was fine sport to kick the lamps. By doing this, they damaged the mantles and so altered the controllers that the lamps were lit earlier than they would be if left undisturbed. An inspector spoke to seeing defendant kick one lamp, causing it to light. He subsequently treated three other lamps in similar style; but these did not light. The Clerk: I suppose they kick these lamps for the supposed fun of seeing them light? Witness: Yes. The Bench said they were unwilling to record a conviction against so young a lad. They would dismiss the case with a caution, on condition that 2s. 6d. was paid towards the costs.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Bromley and Crays Gas Bill, Bury and District Joint Water Board Bill, Glyncorrwg Urban District Council Bill, Lincoln Corporation Bill.

Bills read a second time and committed: Conway and Colwyn Bay Joint Water Board Bill, Derby Gas Bill, Stockport Corporation Bill.

Bills read the third time and passed: Audenshaw Urban District Council Bill, Llanelly and Burry Port Water Board Bill, Pontypridd Water Bill, Skegness Urban District Council Bill.

The Monmouthshire County Council Bill and the Stockport Corporation Bill have been referred to a Select Committee, consisting of Lord Newton (Chairman), the Marquis of Anglesey, the Earl of Hardwicke, Lord Dunboyne, and Lord Seaton; to meet on Tuesday, May 12.

The Ammanford Urban District Council Water Bill, Conway and Colwyn Bay Joint Water Board Bill, Keighley Corporation Bill, Llanelly Gas Bill, Ravensthorpe Urban District Council Bill, Rhymney and Aber Valleys Gas and Water Bill, and Wath-upon-Dearne Urban District Council Gas Bill have been referred to a Select Committee, consisting of Lord Ludlow (Chairman), the Earl of Carnwath, the Earl of Albemarle, the Earl of Liverpool, and Viscount Hill; to meet on Tuesday, May 12.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills read the first time and referred to the Examiners: Audenshaw Urban District Council Bill, Llanelly Gas Bill, Pontypridd Water Bill, Skegness Urban District Council Bill.

Bill read a second time and committed: Huddersfield Water Bill.

Bills reported: Leicester Corporation Bill, Slough Urban District Water Bill [preamble not proved].

Bills read the third time and passed: Bromley and Crays Gas Bill, Bury and District Joint Water Board Bill, Glyncorrwg Urban District Council Bill, Lincoln Corporation Bill.

ELECTRICITY FROM PEAT GAS SCHEME.

The House of Commons Committee Throw Out the Bill.

On three days of last week, a Select Committee of the House of Commons, presided over by Mr. LUKE WHITE, had under consideration the Dublin and Central Ireland Electric Power Bill, the object of which was to supply to a certain area electric power generated by means of gas-engines using peat gas.

The Counsel for the Bill were Mr. FREEMAN, K.C., Mr. ROGER WALLACE, K.C., Mr. W. J. JEEVES, and Mr. J. SEALEY. Against it there were no less than seven petitioners, six of whom were represented by Counsel. Among these were the Dublin County Council, represented by Mr. SEYMOUR BUSHE, K.C.; the Dublin Corporation, for whom Mr. SEYMOUR BUSHE, K.C., and Mr. MACINERNAY, K.C., appeared; and the Alliance and Dublin Consumers' Gas Company, represented by Sir RALPH LITTLER, C.B., K.C., and Mr. A. M. PADDON.

Mr. FREEMAN, in opening the promoters' case, explained at length the objects of the Bill, and said an arrangement had been made with the owner, under which they proposed to buy 500 acres of the nearest of the peat bogs to their generating station. This contained a depth of peat which would enable them to supply current for a great number of years to come, even on the most favourable assumption of business. After this, if they had to go further afield to other bogs, there was plenty of peat; and the land was situated upon such an incline that they would be able to get the peat to the works by mechanical means at a very cheap cost indeed. The peat contained about 90 per cent. of moisture; and with the system they proposed to use, a moisture of 50 or 60 per cent. would be necessary. Therefore the surplus moisture could be got rid of partly by putting the peat out to dry for a little while, and partly in handling it on its way to the works. Without retaining the moisture he had named, the bye-products that they would secure would not be obtained. The electricity works which were at present generating at the cheapest rate from coal were Salford and Newcastle, where the figures respectively were 0·19d. and 0·13d. per unit. The promoters proposed to generate it at a cost of 0·05d. per unit; so that as compared with the one case they would be 0·14d. to the good, and with the other 0·08d. Then, under the process, sulphate of ammonia would be produced, which would about pay the cost of the peat. There were other bye-products which could be obtained; but at the present stage the Company did not propose themselves to undertake this work, but would leave it to other parties. The total capital was fixed at £450,000 in shares, and £150,000 borrowing powers. It was, of course, the first scheme of its kind in the United Kingdom; but the system was at work abroad. The Dublin County Council (who did not themselves supply electricity) objected to the Bill on various grounds; while the Corporation (who were supplying electricity in the city) urged that in any event the City of Dublin should be excluded from the proposed area of supply. The opposition of the Gas Company was mostly on clauses. They asserted that the provisions of the Bill were unnecessary and unfair, and prejudicial to them; and they further urged that there was no public demand or need for the granting of the powers sought, the effect of which would be to establish an uncalled-for competition with the petitioners' business. The Gas Company extended over a very large area. Almost all the urban districts in and around Dublin were supplied by them with gas; but as to some of the places, they had not given a supply at all. In some parts, they charged as much as 4s. 6d. per 1000 cubic feet for their gas. They were, of course, always subject to competition by local authorities and companies setting up electric lighting, which was the thing they most cared about.

Sir RALPH LITTLER: Yes; but we have electric powers ourselves.

Mr. FREEMAN: I know you have, and do not use them much. Continuing, Counsel said the result of the Gas Company's high prices had been that in one or two cases where authorities had obtained powers to supply electricity for lighting, down had come the total cost which the Gas Company were charging by more than one-half for the same supply of gas. He should be extremely surprised if a single case could be shown where a Power Bill had been either refused or materially modified by the objection of a gas company to it. Paragraph 18 of the petition said: "Your petitioners submit that under the provisions of the Bill it will be practicable for the Company to lay down gas-mains, and to transmit and carry gas through such mains from one portion to another of the district; and they object to such powers being conferred upon the Company, as wholly unnecessary to the purposes contained in the Bill." He gathered from this they must be under the impression that the promoters were going to supply gas; but they certainly had no idea of doing so. He had carefully looked through the petition; but he could not find a word in it of what Sir Ralph Littler had just said. The Gas Company did not allege from first to last that they had any electric supply powers; and they were bound by their petition. Therefore he submitted that the Gas Company had nothing whatever to do with the question that day before the Committee. The only point on which they had anything to say was that they wanted the promoters' mains to be laid so as to interfere as little as possible with their own; but this, he maintained, was absolutely provided for by the elaborate arrangements under the existing law.

EVIDENCE FOR THE PROMOTERS.

Mr. *John Sturgeon*, who explained the scheme, said, with regard to the bye-products, that they only proposed at present to deal with the ammonia, which would be converted into sulphate of ammonia. He had obtained from Dr. Watson Gray, of Liverpool, an analysis of the peat it was intended to use; and this showed 1·86 per cent. of nitrogen. To be on the safe side, however, witness had calculated on a basis of 1 per cent.; and this should represent a return in sulphate of ammonia which would pay the cost of getting the peat. The ammonia would be obtained by washing the gas, just as in ordinary gas-works. The 500 acres of bog scheduled, which averaged about 25 feet in depth, would give about 15,000-horse power for 50 years. This was reckoning that the plant would be kept going 30 per cent. of the 24 hours. Among other things, the electric power would probably be used for the manufacture of calcium carbide. Peat charcoal of the best kind could be secured on the spot; and there was plenty of carboniferous limestone. The £600,000 capital would be sufficient to provide 16,000-horse power, and 125 miles of trunk cables. But, even without crediting themselves with anything for bye-products, and charging for the peat itself the price at which they could buy from the turf-cutters, they could generate current at 0·05d. per unit. There was no idea of competing with the Gas Company in their own commodity—gas.

In cross-examination, witness admitted that previous attempts to procure satisfactory results from the utilization of peat as a fuel had ended in failure; but he said the present scheme was on entirely fresh lines for Ireland, though it had been applied in other countries. He could not say how many shares they had promises should be taken. No people would pledge themselves to take shares till they saw how many obstructive clauses, excluded areas, and so on, were to be put in the Bill. They could supply electricity in bulk, with profit to themselves, at a distance of 25 miles from the generating station, at 1d. per unit with a load-factor under 10 per cent., and with a load-factor of 50 per cent. at 0·4d. per unit. The 125 miles of cable were intended to be all overhead high-tension wires; but the time had not yet arrived to ask the sanction of the Board of Trade to this. If Dublin were excluded from the Bill, as was the case with Belfast in the Belfast and North of Ireland Electricity and Power Gas Act of 1904, the scheme would be difficult to finance. The reason why Belfast was excluded was because of a proposal in the Bill to lay large power-gas mains through the city. He did not know that in Dublin the Gas Company were supplying electric power for lighting purposes, and that they were stopped owing to their overhead wires.

Captain *H. Riall Sankey*, who stated that he was a member of the Committee of the Institution of Civil Engineers on Standards of Thermal Efficiency for Internal Combustion Engines, a member of the Committee of the Institution of Mechanical Engineers on Gas-Engine Research, and a judge of the trials of suction-gas plants by the Royal Agricultural Society, said he had twice been to Germany for the special purpose of investigating the present-day methods of dealing with peat on the Continent. In Germany, the question of the utilization of peat was in a totally different condition from what it was in this country. The manufacture of gas from peat for use in engines was there an undoubted fact, and could be most successfully carried out. The efficiency of a gas-engine was twice that of a steam-engine, comparing the best of both kinds. The efficiency of a gas-engine did not vary very much, while that of a steam-engine did, according to the make and conditions under which it was working; and it was quite easy for the efficiency of a gas-engine to be three times that of a steam-engine. As to the bye-products from peat and coal when the gas in each case was used in a gas-engine, rather more sulphate of ammonia would be secured with peat than with coal; but, in addition, in the case of peat one got methyl alcohol, acetate of lime, paraffin, and one or two other bye-products. The value of the sulphate of ammonia was about equal to that of all the others combined; so that, roughly, one might say that the value of the bye-products obtained from peat, as compared with those from coal, in both cases using gas in a gas-engine, was nearly double. He found that 2·2 lbs. of peat would produce a unit of electricity; and at 4s. 2d. per ton, this worked out at one-twentieth of a penny per unit. Peat gas was satisfactory for use in engines because it did not contain a very large amount of hydrogen, which gave trouble in engines; and there was in it no sulphur—or, at any rate, only a very small amount. The tar in the peat was of a different

nature from what was obtained from coal; the result being that the deposit which formed on the valves of the engine, on the cylinder head, and on the piston head was of a friable nature, whereas the corresponding deposit from coal was hard and sticky, and required a great deal of work to get it off. The practical result was that the great bugbear of gas-engines—especially of large ones—which was known as pre-ignition, did not occur with peat gas. The calorific value of the gas itself was very slightly less than that of Mond gas. An engine which would give a certain horse power with town gas would give from 5 to 10 per cent. less power with peat gas. The value of the sulphate of ammonia obtained would be about 4s. per ton of peat, which wiped out the cost of the fuel; and the other bye-products would be worth a further 4s. In the case of sulphate of ammonia, this would be the net profit, after providing sulphuric acid, plant, and depreciation of machinery, &c.

Mr. SEYMOUR BUSHE (in cross-examination): If every ton of peat more than pays itself for residuals, the electricity or the customer becomes a negligible quantity—you can do without him. You are satisfied you are making a profit whether the electricity is bought or not. It would be rather hard to press in reluctant customers, when they only mean so much pocket-money that you do not want. However, that is not a question for you. You get as much as you can?

Witness: Certainly; I always try to.

In how many places abroad is there at present actually in commercial operation the system you advocate here?—At several places in Sweden and a place called Schelecken, in Germany, which I have visited.

Cross-examined by Mr. PADDON, witness said he took the price of sulphate of ammonia as £11 a ton. If the price should go down to £6 10s., it would qualify his estimate to that extent. As to whether the Company's operations were likely to influence the price, this depended upon their output as compared with the present production. It was a "fleabite" really. Dr. Mond's process might also be another source of sulphate of ammonia. He did not suppose, if the Company could get 8s. worth of residual products at a cost of 4s. to work, that there was anything to prevent people going to the place and carrying on the same operations in competition with the Company. The calorific power of the peat gas was from 128 to 140 B.Th.U. per cubic foot; whereas the calorific value of coal gas, on the same basis, might be taken, in round figures, as 600 B.Th.U. per cubic foot.

Evidence was then given by a number of other witnesses in favour of the scheme.

Mr. *A. B. Wilson*, questioned as to possible injury to the Dublin Gas Company by the introduction of a cheap supply of electricity, said that in Belfast electricity was installed seven years ago. In 1903, the gas profit used in reduction of the rates amounted to £19,362; and the profit derived from the electrical department was £2602. In 1907, the reduction of rates from gas was £25,272, and the profits made by the electrical department £11,479. So that the two had advanced simultaneously; but if anything the gas had gone the faster. The demand for gas, instead of being reduced by the production of electricity, had rather increased. The average price in Belfast was 1·263d. per unit for electricity; while for gas they paid 1s. 11d. per 1000 cubic feet, less certain discounts for large consumers. The conflict between the two commodities was therefore very intense. Of course, the gas and electrical powers there were in the same hands.

Mr. *R. F. Heron*, Town Clerk of Blackrock, said that, in the event of the Bill passing, his Council would be prepared to take a supply of electricity in bulk and distribute it among the inhabitants. The Company undertook to erect a transforming station, and to deliver the current ready for supply to consumers at 1½d. per unit—this figure to be reduced to 1d. if the supply in one year should exceed 800,000 units. He calculated the cost of distribution at about 1½d., which would make the cost to the consumer about 3d. per unit. At present the Dublin Gas Company charged them 3s. 10d. per 1000 cubic feet for gas; but there was a reduction of 10 per cent. to the Council for public lighting. He thought the people in Blackrock would take electric light very freely at the price named.

Mr. *L. Wickham*, Chairman of the Blackrock Urban District Council, said he considered the agreement come to was a satisfactory one, and that if the Council could by its means supply electricity to private consumers at 3d. per unit it would reduce the bill for lighting to about one-half what it was at present.

Mr. PADDON (in cross-examination): Can you understand, if that is the fact, why the City of London have turned out electric light and gone back to gas? They cannot look upon it from the same point of view as you do?

Witness: Well, they do not generate electricity from peat in London.

Mr. *P. Cunniam* said he was Clerk of the Rural District of Rathdown No. 1. His Council had power to light two portions of their district—Dundrum and Stillorgan; and they were dependent upon the Dublin Gas Company for this. The price was 4s. 3d. per 1000 cubic feet. If the proposed works were carried out, he believed there would be a good demand in the district for current for both lighting and power purposes. He was also Clerk of the Rural District of Rathdown No. 2, who had passed a resolution in favour of the Bill.

Mr. *S. Geoghegan*, an engineer, said that from what he had seen of the process in Germany, he had no doubt the peat could be remuneratively employed as proposed under the Bill.

The CHAIRMAN: Would it affect your position with regard to the success of this scheme if Dublin, Rathmines, Pembroke, and other urban districts were left out?

Witness: Yes. I think it would be rather emasculating the scheme.

Mr. *E. A. Aston*, a member of a firm of mechanical and electrical engineers and contractors in Dublin, stated that in the districts of Dublin, Rathmines, and Pembroke there were a number of mills that were anxious to obtain electric power, if it could be had at favourable rates. If the Dublin Corporation chose to take their current from the Company, they would be supplied at a substantially less figure than it cost them to obtain it now by their own plant; and the same remark applied to Rathmines and Pembroke. He thought the Company would be prepared to supply a large quantity, like that which would be required for Dublin, at ⅜d. per unit.

Sir RALPH LITTLER (in cross-examination): Are you aware that, notwithstanding the excellent administration of electricity by the Dublin Corporation, the Gas Company are supplying 400 gas-engines for the production of power, and some of them are actually being used for the purpose of generating electricity?

Witness: I have put in many myself for that purpose in Dublin, and hope to do so again.

The CHAIRMAN: Do you agree that Dublin is the most important feature in this scheme?

Witness: I look upon it as a feature which is essential to the development of the scheme. I do not say it is essential to the scheme going on; but I do say that it is essential to the scheme working under its best possible conditions.

Captain *Sankey*, re-called, said he had since giving evidence prepared an estimate of costs and profits. He started with a 12,000 kilowatt plant, and a 30 per cent. load-factor, which would give 34,000,000 units per annum. For this would be required 33,000 tons of dried peat. The total cost per unit he put at 0·42d.; and if it were sold at an average rate of 0·75d., the profit would be 0·33d. per unit., or £46,000 a year. Reckoning £6000 for wayleaves, &c., there would be a net profit of £40,000—without reckoning anything at all for bye-products. Adding the profit on the bye-products, at 8s. per ton, there would be a further sum of £13,200. The profit on the electricity alone would be equivalent to 7 6 per cent. on the ordinary shares of the Company, after meeting the debenture interest; and if residuals were included, this figure would be increased to 9·5 per cent.

Sir RALPH LITTLER (in cross-examination): Is there one bye-product which you mentioned in your evidence which gas companies do not make?

Witness: Yes, there is methyl alcohol; and I do not think they make paraffin.

Practically speaking, leaving the alcohol out, because I do not think much of that, are there any main products which are not also bye-products of any gas company?—Yes; I mentioned methyl alcohol for instance, and others.

Have you any idea what that is going to bring you in?—Yes; about 4s. a ton altogether.

This is exactly the same sort of idea as Mr. Mond's, is it not?—Yes; except that they only have the sulphate of ammonia.

We know he has been five years about it, and not much has been done yet?—Quite so. We are benefiting by his experience.

Mr. *A. R. Chorley*, Solicitor for the Bill, said that Dublin had an absolute right of veto; and the Company could not force themselves upon them without their wish. He was confident, however, that Dublin would be only too glad for the Company to supply their manufacturers in districts where the Corporation had not mains. This had been the case with other Power Companies.

OBJECTIONS TO THE SCHEME.

At the conclusion of the promoters' case,

Mr. SEYMOUR BUSHE addressed the Committee on behalf of the Dublin Corporation, who, he said, did not believe the scheme was a business one. Possibly in their long corporate life they had seen a great many projects, and plans, and persons going down into the Bog of Allen; and they knew what the result had been. There was nobody behind the present scheme at all. It was merely an attempt to recover the position lost in Belfast. The only money raised had been for the actual expenses of the promotion of the Bill. He thought he was entitled to say that, if it were proved that the Corporation had now established a handsome and worthy electrical plant in Dublin, it was a very serious proposition to suggest that this scheme should result in putting upon them the necessity of scrapping the whole of it—which must be the result if they were going to take electricity from the promoters. Dublin had been the obvious objective all through. "Cut Dublin out of the Act," he said, "and then give them the Act, and our good-will with it." As to the County of Dublin, any points that would arise would be matters of clauses.

Sir RALPH LITTLER, speaking on behalf of Pembroke, and of the Alliance and Dublin Gas Company, said there were some small manufacturers in Dublin—it was not a manufacturing city—and they were content with the Gas Company, who supplied no fewer than 400 of them with the sort of power they wanted (gas-engines) at so moderate a rate that they came to the Gas Company, and continued to do so, rather than go to the Corporation; and not one of these manufacturers could be found to say they wanted to take the promoters' power. To pass the Bill would be simply to hand over the district—if there was any reasonable probability of a hopeful scheme for Ireland being carried out—for the next five years to speculating gentlemen who did not even themselves know how much the scheme was going to cost, and who were going to try to get what they could out of the public, and not themselves find the money for carrying out the works. As to the question of bye-products, this was obviously neither more nor less than a "red-herring," because, with the exception of the brewing of alcohol, there seemed to be no bye-product which was not at present produced by gas undertakings. The Dublin Gas Company had these bye-products to the extent that was required by the market; and did anyone suppose there would be a vast export from Ireland of these commodities? It was not necessary to call any evidence with regard to this, because everybody knew that, not only from time to time, but very frequently, all gas companies in the United Kingdom were overwhelmed by the quantity of the bye-products which they were obliged to store, as the market was insufficient to get anything like an adequate return. The promoters expected to get electrical power and lighting in competition with the City of Dublin—because it could not be blinked that what they really intended to do was to create an agitation until they got the opportunity of competing with the Corporation in Dublin. They were also coming into competition with the authorities at Rathmines and at Pembroke who had already secured electrical powers. They were coming into competition with the Alliance Gas Company, who had been in existence for a great number of years, and who were doing their duty exceedingly well. One of their Acts authorized the Gas Company "to make and supply gas and other improved means of lighting for public and private purposes." Clause 9 said: "Nothing in this Act or in any of the former Acts shall be taken or held to authorize the Company to open any street or public thoroughfare for the purpose of laying down pipes, wires, or other apparatus

to supply electricity for any purpose without first having obtained the consent of the Board of Trade." The words which he had read, that the Company might supply any improved method of lighting, were recognized by Parliament as including electricity—they had the power to supply electricity now. But though they were in possession of the district, and might have supplied lighting by overhead wires, the Board of Trade were empowered to suppress overhead wires, and as the Corporation came upon the scene, the Company were content to let them take the electrical work, and themselves discontinued it. Therefore there were two electrical undertakings in Dublin. The Gas Company had been content to keep to their main purpose of supplying gas, so long as the work was in the hands of the Corporation. Whether they would be content or not under new conditions, he could not say. If the Corporation were not disposed to go on supplying electricity—if they were not disposed to increase their works—the Gas Company said that they, having already got the power, were the persons who might fairly expect to do it, and to say: "Very well, if you will not do it, we will, and we can."

THE BILL DEFEATED.

Mr. FREEMAN, replying for the promoters, referred at some length to the financial aspect of the question. He said they could not have done more than they had done—namely, call responsible persons who were prepared to put down substantial sums in order to get the chance of carrying the business out by means of the Bill.

The CHAIRMAN: I do not think there has been much evidence as to the substantial character of the sums. The witnesses never put it into figures.

Mr. FREEMAN: Witnesses have been brought before you who know the district; and we are prepared to say that we believe it is a scheme which can be financially carried through. The very worst that can happen, if it is not carried through, is this—it has done no harm except to the people who have already put their money into it.

The CHAIRMAN: I think there is a very serious responsibility cast upon the Committee with regard to being satisfied as to the financial prospects of the undertaking.

Mr. FREEMAN said it was the start which was the only difficulty. They believed that directly they could get the matter before the manufacturing public, they would find, as other Power Companies had already found, people coming and making offers to them. They had called evidence to show that a substantial interest was taken in the scheme; and he could not put the matter farther than that. If the Bill was refused, the Committee would prevent a very good chance of prosperity coming to a part of Ireland which badly needed it.

After consultation in private,

The CHAIRMAN said: The Committee have given very careful and full consideration to all the evidence and arguments which have been laid before them with regard to this Bill; and they have come to the unanimous decision that the preamble of the Bill has not been proved.

REJECTION OF THE SLOUGH WATER BILL.

In the "JOURNAL" for the 31st ult., we reported the first portion of the proceedings before Sir Henry Kimber's Committee on the Bill promoted by the Slough Urban District Council to authorize them to purchase compulsorily the undertaking of the Slough Water Company. The Committee had expressed the opinion that, if the Council were willing to come to terms with the Company, they would be disposed to pass the Bill subject to its going back to the ratepayers for the acceptance of the figure. On the resumption of the proceedings last Tuesday, Mr. Wedderburn, K.C., stated that the promoters had endeavoured to settle terms with the Company, but the latter would not sell except at a price such as only madmen would accept; and he desired to lay the correspondence before the Committee. Mr. Honoratus Lloyd, K.C., on behalf of the Company, objected to the correspondence being read, as all their letters were written without prejudice. The Company did not want to sell; but, in deference to the views of the Committee, they had mentioned a price. As the parties had not come to terms, he asked the Committee to carry out their decision and reject the Bill. The Chairman said the Committee could not go into the correspondence. They were of opinion that a case had not been made out for compulsory purchase; and though they were anxious that the parties should come to terms, and avoid wasting the money spent, they were not going to put compulsion upon them. They were willing to assume that the Council made what might possibly be a handsome offer; but the Company did not choose to accept it. The Committee could only be sorry for it; but they were not going into the matter as an arbitrator to decide what was or what was not a reasonable sum. A case had not been made out for compulsory purchase, and that was the decision of the Committee. They therefore declared the preamble of the Bill not proved.

CAMBORNE WATER BILL.

The Unopposed Bills Committee of the House of Commons presided over by Mr. CALDWELL had before them last Wednesday the Bill promoted by the Camborne Water Company, for power to raise further capital and for other purposes.

Mr. Baker, the Agent for the Bill, stated that the Company were formed in 1867, and obtained further powers in 1890. They now sought authority to raise additional capital to the extent of £25,000. The Bill was promoted at the urgent request of the District Council, who gave it their support. In respect of the existing capital, the borrowing powers were one-fourth. At present the Company charged for certain purposes 5s. per 1000 gallons; but by a new clause which had been inserted, the maximum charge would be 2s. The further consideration of the Bill was adjourned for a week pending amendments.

BLACKBURN CORPORATION BILL.

Gas, Electricity, and Water Clauses.

The Police and Sanitary Regulations Committee of the House of Commons—with Mr. CORRIE GRANT as Chairman—had before them last week the Blackburn Corporation Bill. Section 7, which deals with an extension of the area of supply of gas and electricity, and other matters, was considered on Wednesday.

Mr. A. J. RAM, K.C. (who, with Mr. JEEVES, appeared for the promoters), in explaining the nature of the proposals to the Committee, remarked that though in one sense the gas undertaking had more than paid its way, it had contributed nothing to the rates. Maintenance, renewals, &c., had had expended upon them heavy sums which might otherwise have been handed over in relief of the rates.

Mr. *S. R. Ogden*, the Manager of the gas-works, gave evidence to the effect that, in addition to supplying the borough of Blackburn, the Corporation also supplied with gas nine townships outside. They sought power to include the township of Clayton-le-Dale, which had a population of under 1000, but which was being rapidly extended, and where a number of new houses were being erected. They were already supplying 26 consumers.

This clause was passed, together with several which were auxiliary to it.

The following clauses were then considered:—

The Corporation may refuse to supply electrical energy and gas, or electrical energy or gas, to any person whose payments for the supply of electrical energy or gas, or for the hire of any meters used in connection with electrical energy or gas, are for the time being in arrear, whether any such payments be due to the Corporation in respect of a supply of electrical energy or gas, or for the hire of any such meters, used on the premises in respect of which such supply is demanded, or in respect of other premises.

In any case where the Corporation supply both gas and electricity to the same person, and he fails to pay the rent charges and sums due from him in respect of either such supply, the Corporation shall have the same powers to cut off and stop both supplies as they would have with respect to the supply of gas if he neglected to pay the rent due for the same.

Mr. JEEVES said that consumers at the present time had a choice of supply; and, as both belonged to the Corporation, they did not want consumers to be able to ring the changes on them.

Mr. LAYLAND BARRATT (a member of the Committee): Do you mean to say you have people in Blackburn sufficiently well off to take a supply of both illuminants in their houses, and who would yet use the one in order to "do" you over the other?

Mr. JEEVES: Yes. I can call evidence to that effect if desired.

Mr. LAYLAND BARRATT said it seemed the Corporation were endeavouring in this clause to collect their debts on one undertaking by the aid of the other.

Mr. JEEVES remarked that, on the other hand, they were endeavouring to prevent themselves being swindled on one by the aid of the other.

The Committee decided that each undertaking must stand alone, and rejected the clause.

Power was sought, also, in respect of the Corporation water undertaking, to purchase from time to time by agreement and hold any lands which they may deem necessary for the purposes of protecting the waters and water-works against nuisances, encroachments, injury, and pollution; and a sum of £40,000 was sought to be borrowed for these purposes, to cover any expenditure already made in this direction and future expenditure.

After evidence by Mr. *William Stubbs*, the Borough Engineer, and the *Town Clerk*, this clause was granted.

LEICESTER CORPORATION BILL.

The General Powers Bill of the Leicester Corporation, which contains provisions for extending the limits of gas and water supply, selling a portion of the gas-works and plant to other sanitary authorities, testing gas, and conferring further powers in regard to the supply of electricity, was last week considered by the Police and Sanitary Committee.

The gas provisions of the Bill were unopposed. With regard to the extension of the limits of the water supply, Mr. Jeeves, who represented the Corporation, mentioned that only two parishes—Enderby and Harborough—had objected to come in, and they had been struck out of the Bill. Alderman Vincent, J.P., ex-Mayor of Leicester, and Chairman of the Finance Committee, was called to give evidence on the water question. He said the present area of supply was 60,617 acres, containing 59,378 houses, and an estimated population of 275,513. The present source of supply was obtained from three reservoirs in the county. The drainage area was 10,760 acres, and it afforded a daily supply of 5,300,000 gallons a day. Under the Derwent Water Act of 1899 Leicester would obtain an additional supply of 5 million gallons a day in 1910. It would be an advantage to these outside parishes to come within the limits of supply now; otherwise they would have to bear the cost of laying down their own mains. The total area of the parishes proposed to be added to the limits of supply was 18,741 acres, with a population of 9736, and a rateable value of £53,000. These parishes were within the 10-mile limit mentioned in the Derwent Act. Witness explained that Leicester's annual share in the expenses of the Derwent Water Board would be £51,864, and probably more; and the annual charge for bringing the water from the border of the county would be about £22,500. Therefore, £74,364 a year was the least that Leicester could expect to pay for the additional supply from the Derwent. It was estimated that the present profit on the water undertaking was £16,000; and by reductions and savings there would be an estimated saving of £8000 a year. Deducting these two sums, there was still £50,364 a year to be paid. By increasing the water-rate by 2½ per cent., £25,000 would be obtained. With regard to the remaining £25,364, the Corporation could apply to the purpose a reserve fund which in the year 1910 would amount to

£170,000. The Committee decided that they would sanction the increase of 2½ per cent.

With respect to the gas and electricity portion of the Bill, Mr. Alfred Colson, the Engineer and General Manager of the gas and electricity undertakings of the Corporation, said that it was proposed to extend the gas limits to Markfield, Rothley Woodhouse, and Swithland. Gas was supplied in the first three places to about 600 consumers without statutory powers. Some 18,000 yards of main had to be laid to give these supplies, at a cost of £6131. From 1878 to 1907, the gas sent out from the works increased from 518 million to 2020 million cubic feet, the number of consumers from 19,000 to 55,952, and the length of mains from 90 to 272½ miles. The Committee passed the clauses referring to these matters.

LEGAL INTELLIGENCE.

Arrest of a Gas Company's Chairman.

A great sensation was created in Ayr on Thursday when it became known that Mr. Robert M'Vicar, Chairman for the last fifteen years, or thereabout, of the Ayr and Newton Gas Consumers' Company, had been arrested, on a Sheriff's warrant, on a charge of having, between Jan. 1, 1900, and April 1, 1908, embezzled sums amounting to £10,650, in the Gas Company's office, or elsewhere, while acting as Chairman of Directors and as Secretary and Treasurer of the Company. Mr. M'Vicar is about sixty years of age, and has been in business in Ayr for nearly forty years; being latterly the head of the firm of Currie, Rae, and Co., drapers, of High Street, Ayr. He was for a time an elder in Ayr West United Free Church. On Friday, he was brought up at the Burgh Court in Ayr, and the charge formally made against him. On account of the serious nature of the charge, at the request of the prosecutor, the accused was remitted to the Sheriff. Later in the day, he was brought before Hon. Sheriff-Substitute Lockhart, in private, and emitted a declaration, which may be used against him if the case goes to trial. He was then committed to prison, to await further proceedings. His tenure of the office of Secretary and Treasurer of the Company only lasted for a few months; but whether recently or not, is not stated.

Injuries through an Alleged Defective Griller.

At the Ramsgate and District County Court last Wednesday, his Honour Judge Shortt delivered a considered judgment in an action brought by Mrs. Stella Bryson against the Corporation of Ramsgate, to recover £50 in respect of injuries alleged to have been sustained by her in consequence of the breaking of a griller supplied by the defendants. The breakage caused a saucepan of boiling water to fall over her arm, necessitating the calling in of a medical man, whose bill amounted to £8 11s.; and she had also been put to other expense for help in her domestic affairs. At the hearing at the March sitting, Mr. E. Doughty (instructed by Messrs. Mercer and Whitehead) appeared for the plaintiff; Mr. W. W. Mackenzie (instructed by Mr. A. Blasdale, the Town Clerk) represented the Corporation. In giving judgment, his Honour first stated the conditions under which the Gas Committee of the Corporation let grillers, and then said the plaintiff, who occupied a house to which the defendants supplied gas, made the necessary application, and was supplied with a griller. It was placed on a dresser, which sloped outwardly downwards. Shortly after it had been fixed, the plaintiff lighted the griller and put on it a saucepan filled with water. By the time the water had become boiling hot, the griller cracked, the saucepan fell off, and the plaintiff was severely scalded. It was said, in the first place, that the defendants were guilty of negligence in supplying a griller which must have had some flaw in it that caused it to crack; but he held that, on the evidence, there was no negligence in this respect. It was contended, in the second place, that the defendants ought not to have placed the griller on a sloping surface, from which it was liable to fall off. On this point there was conflict of evidence as to what occurred when the defendants' employees brought the griller to the plaintiff's house. But he was satisfied, on the evidence, that they were told by the plaintiff to stand it on the dresser until she could find a more suitable place for it; that they pointed out to her the risky nature of such a proceeding; but that, notwithstanding this, she repeated her instructions as to where to put it. He could not, therefore, hold that the plaintiff was entitled to recover damages for the consequences of an act done under her express directions. It was argued, in the third place, that the defendants implicitly warranted the flawlessness of the griller, and that they were liable for breach of such warranty. He could find nothing in the facts to justify the implication of such a warranty; nor did any of the authorities referred to throw light upon the case. But there was a further and wholly distinct ground on which, in his opinion, the plaintiff could not succeed. Even supposing there had been a warranty of flawlessness and a breach of it, the injuries received by her were not the consequences of such a breach. It had been proved to his entire satisfaction, and was indeed admitted by the principal witnesses for the plaintiff, that if the griller had cracked when standing on a level surface the saucepan would not have fallen off, and the plaintiff would not have been injured; in other words, that the *causa causans* of the saucepan falling off was not the cracking of the griller, but the sloping surface on which it was placed. For this, as he had already said, the plaintiff was herself responsible. Judgment must therefore be for the defendants. He would stay execution for fourteen days; and if notice of appeal were given within that period, he granted a further stay pending the appeal. In case the High Court should take a different view from that which he had expressed, and to avoid the expense of a new trial, he would now assess the amount of damages sustained by the plaintiff at £21.

MISCELLANEOUS NEWS.

ALLIANCE AND DUBLIN GAS COMPANY.

The Mines (Eight Hours) Bill—The Strike at the Gas-Works.

The Half-Yearly Meeting of this Company was held at the Offices, D'Olier Street, Dublin, last Tuesday—Mr. JOHN MURPHY (Deputy-Chairman) presiding in the absence of Alderman Cotton, the Chairman.

The SECRETARY AND MANAGER (Mr. Francis T. Cotton) having read the notice convening the meeting, the report and accounts for the six months ending the 31st of December were presented. The accounts showed that the gross revenue amounted to £167,247, and the expenditure (inclusive of debenture interest, &c., £6905) to £132,044; leaving a net balance of £35,203 available for distribution. The Directors in their report recommend dividends of 10 and 7 per cent. per annum on the respective shares. Payment of these would absorb £35,007, and leave £196 to be carried forward.

The DEPUTY-CHAIRMAN, in moving the adoption of the report, said he greatly regretted that the Chairman, Alderman Cotton, was quite unable, owing to indisposition, to preside as usual at the half-yearly meeting. In asking the shareholders to adopt the report and accounts presented, he said the working in the half year to which they referred had resulted in a slight increase in the sale of gas compared with the corresponding period of the previous year. Indeed, with few exceptions, the increase in the sale of gas had been very small with companies and local authorities all over the kingdom. This was accounted for by the greatly extended use of incandescent gas lighting, particularly by the inverted system, which, while increasing the light, reduced the consumption of gas. The revenue from the sale of gas and from meter-rents amounted to £146,225, and from residuals to £20,651; the latter sum being made up as follows: Coke, £13,910; tar, £3555; sulphate of ammonia and ammoniacal liquor, £2413; breeze, £773. Turning to the expenditure side of the accounts, there had been an increase of £14,000. Under the head of coals and oil, it amounted to £7722; and under wear and tear, manufacture, &c., to £1935. It would have been seen from the report that the Directors had recommended the small reduction of one-half per cent. in each dividend, making them 10 per cent. and 7 per cent. respectively. The conditions under which the Company's business was carried on during the half year were, from a combination of causes, extremely adverse. Prominent among them were the large increase in the price of coal, the serious trouble in the labour market, resulting in the strike (which the Directors were able to successfully combat), and the high discount rates reigning in the Money Market. To maintain, under these conditions, their dividends at 10 per cent. and 7 per cent., the Directors considered satisfactory. They believed the adoption of the course they had recommended, of a slight reduction in the dividend, was the one best calculated to conserve the strength of the Company. During the past half year, large quantities of the coals carbonized were delivered under old contracts entered into over 2½ years ago at reasonable prices; otherwise the cost of manufacture would have been much greater, as the new contracts exceeded the old ones by nearly 50 per cent. in price. This was a very serious matter for those engaged in the iron and steel trades, as well as for gas companies and all manufacturers who were depending upon coal for fuel. But the greatest hardship of all was inflicted on the poor, whose means were limited. However, he was glad to be in a position to say that prices were moderating; and, unless the Government insisted in pressing forward the Mines (Eight Hours) Bill, he expected a considerable reduction might be looked for before the end of this year. The whole of the additional expenditure in connection with the strike at their works did not appear in the accounts for the half year under review. The strike took place a few days before Christmas, when most of the Company's workmen left their good employment. He said "good employment," because the men were always treated with kindness and consideration. Unfortunately for themselves, they were led to believe that they could not be done without; and, instead of taking the advice of those who always had a deep interest in their welfare, they—instigated by comparative strangers—walked out of their work. The worst feature in the case was that they did so at a time when their action was most calculated to disorganize the whole of the works and leave the city in darkness in the middle of winter. It was only by almost superhuman efforts upon the part of the Engineer (Mr. W. F. Cotton) and his staff that such a catastrophe was averted. It was a matter of much regret that the consideration given to them by the public generally during this anxious and trying time was withheld from them by the Corporation, who, so far from making any allowance for their difficulties, selected this moment to draw special attention to the decreased illuminating power of the gas, without stating the cause of it, and threatened legal proceedings against the Company, which, however, they did not eventually proceed with. He could only say that it was not in the power of man to maintain their standard under such conditions; and he contended that they were entitled to be congratulated upon having been able to give a continuous supply of gas under the exceptional circumstances of the case.

Mr. C. LAWLER seconded the motion.

Mr. MAGUIRE observed that, if the Miners' Bill was passed, the price of coal must go up enormously, and seriously affect their concern. It was to be hoped the Government would listen to the representations made by the different commercial bodies in England and Scotland, and abandon a Bill which would be destructive of the manufacturing interests of the country. The present Government were clearly responsible for the high price of coal. With a view to capturing the vote of the miners, they took the 1s. duty off coal, with the result that its price had gone up to an exceptionally high figure.

Mr. H. E. JONES rejoiced to hear that the Company's staff coped successfully with the strike, which was forced upon them in the depth of winter. The labourers had been treated fairly well; and when they made an unreasonable demand, it was quite right to resist it.

The DEPUTY-CHAIRMAN explained, with regard to the Miners' Bill, that Alderman Cotton, the Chairman, joined the deputation that

approached the Home Secretary on the subject. With regard to the strike, he could not speak too highly of the conduct of their Engineer and the staff at such a critical time.

The report was adopted, and the dividends recommended were declared.

The retiring Directors and Auditor having been re-elected, the proceedings concluded with a vote of thanks to Mr. Murphy for presiding, as well as to the Directors and staff, especially the Engineer.

SAN PAULO GAS COMPANY, LIMITED.

Progress of Business—Large Extension of the Contract.

The Annual General Meeting of the Company was held on Monday last week, at Winchester House, Old Broad Street, E.C.—Mr. D. M. Fox in the chair.

The SECRETARY (Mr. G. H. Rogers) read the notice convening the meeting; and the Directors' report and statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said for many consecutive years it had been his privilege to congratulate the shareholders on the continuously increasing prosperity of their business; but never had he done so with greater satisfaction with the present, and confidence in the future of their undertaking, than on this occasion. The result of the past year's working was the most satisfactory of any year since the price of gas was reduced to its present level, and afforded ample proof of the wisdom of their policy of supplying cheap gas. Speaking on general topics, he said the "fixation" of exchange at 15d. per milreis, and the "coffee valorization" scheme, seemed to have acted beneficially to the coffee planters and to commerce generally. The rate of exchange during the year was practically stationary at 15¼d.; and this steadying of exchange had been distinctly favourable to the Company's business, and to commerce generally. Turning to the statement of accounts, the shareholders would see that the gross receipts for the past year were £152,400, showing an increase over 1906 of £17,792. The working expenses (including London charges, &c.) were £115,476; and the profit for the year was £36,924—an increase of £8132. After adding to the profit the £4100 that was brought forward, and deducting £7421 for debenture service, &c., the disposable balance remaining was £33,602. This enabled the Directors, after placing £8000 to reserve account, to recommend a final dividend of 5 per cent., free of income-tax (making, with the interim dividend of 3 per cent. paid in September last, a total dividend of 8 per cent. for the year), and to carry forward the substantial balance of £5602, or £1502 more than the previous year. The shareholders would no doubt have noticed that this was the first occasion on which a full year's interest was payable on the whole of the £125,000 of debentures; the sum required for this showing an advance of £2360 over the previous year. The receipts under every heading, except tar, exhibited satisfactory advances. The prices obtained for coke, and the great demand for it—at times exceeding the supply—accounted for the large increase in the receipts for residual products; there being, however, a slight falling off in the demand for tar from the coffee planters in the interior owing to temporary depression in the coffee market. Turning to the expenditure, the cost of coal, oil, &c., was but little over that in the previous year, although 1478 tons more coal was carbonized. This satisfactory result was due to the Directors having secured contracts in the spring on favourable terms, under which coal was obtained throughout the year at much below market prices—acting, as the Board invariably did in all such matters, on the advice of their excellent Managing Director, Mr. A. F. Phillips. Repairs were lower than in 1906; and this helped to reduce the manufacturing costs, which were actually lower than in the previous year, notwithstanding that 38 million cubic feet more gas were produced. The distribution expenses showed an excess of £4000 over those of the previous year, owing principally to improvements effected in the mains, and heavier meter renewals, all of which had become necessary. The number of public lamps in the city increased during the year from 4552 to 4768. Private consumers increased by 1130; and the number of meters in use at the end of the year was 9725. The use of gas for cooking purposes was rapidly increasing; and without doubt before long the employment of gas as fuel would be general. The balance-sheet showed the sound financial position of the Company. Expenditure on capital account during the year was £19,448. The water-gas plant was responsible for £10,604; the remainder was made up of new mains, lamps, meters, &c., and acquisition of land. The expenditure on the Company's new site amounted to £4723. The area acquired was about 48 acres, and was immediately contiguous to the San Paulo Railway main line, about two miles distant from the centre of the city. Other works in hand of a capital nature included a three-lift gasholder of a capacity of 1 million cubic feet, which was expected to be finished by February, 1909. The transfer of £8000 to reserve raised the fund to £55,000, of which one-half was invested in high-class securities that were written down below current quotations. In view of the threatened railway trouble at home during the latter part of last year, large quantities of coal were shipped; and this accounted for the abnormally high value of stocks of coal and material in San Paulo. And now he had further good news to tell the shareholders—good news, he said without hesitation, because, although the step the Directors had taken in authorizing the signing of an agreement between the Government of the State and the Company, involving important alterations in the Company's contract which would have far-reaching effects, he regarded the amicable settlement of any question between the Government and the Company as matter for congratulation. Such an agreement had been signed by their representative, Mr. R. Gray, after protracted negotiations extending over the last two years or so. The contract under which the Company were working was made in 1897, and was for a period of thirty years, terminating in 1927. Clause 44 of the contract provided that "at the expiration of the period of privilege, should the Government not renew the contract, it shall pay to the Company in gold the value of its plant valued by arbitrators." This clause was, of course, a most valuable asset of the Company, and one which the Board never had the slightest intention of surrendering. But, though the clause was in itself perfectly fair to the Government, the continual growth of the city and the constantly increasing use of gas by the population called for extensions in different parts of the city, to such an extent—the cost of which extensions had by the contract to be charged to capital—that the Government became nervous as to the large sum of money for which they might be liable at the termination of the contract in the year 1927. The result of this anxiety for the future was that the Government hesitated, and often refused to sanction the extensions called for by public needs, unless the Company agreed to carry them out without charging the costs of them to the value of the estate to be valued and paid for at the termination of the concession, which condition, of course, the Company could not possibly accept. Thus the natural development of the Company was restricted; and the public, as well as the Company, suffered from the restriction. This state of things could not be continued. In consequence, negotiations were opened for the revision of the contract; the Company on their part consenting to the cancellation of clause 44, and the Government on their part agreeing to modify certain clauses of the contract in favour of the Company. The result was briefly: (1) The Government were relieved from the obligation in 1927 to either renew the contract, or pay the Company in gold the value of their plant in 1927. (2) The Company in return had obtained: (*a*) An extension of the period of the contract from 1927 to 1950, or a further 23 years, with full privileges; and after this date the entire works and plant remained the property of the Company, which would be free to work the same as a common industry under the common law of the country. (*b*) Increased guaranteed public lighting of streets, squares, &c., from 1,500,000 to 2,000,000 cubic metres. (*c*) A fixed maximum price of gas at 140 rs. per cubic metre as long as exchange did not exceed 20d. per milreis, and at 150 rs. when exchange was above 20d. per milreis, during the whole period of the concession, without being subject to certain reductions of price stipulated in the contract of 1897. (*d*) Freedom to charge private consumers such rates as might be deemed advisable, without reference to the fixed charge per cubic metre guaranteed for public lighting. He need not say, after this, that the Company's relations with the Government and its officials were most friendly, and that the Company had the goodwill of the people of San Paulo. That this was so was in no small degree owing to the tact and business capacity of their popular Manager, Mr. Richard Gray, who had conducted these difficult negotiations in a skilful manner. The Board also desired to recognize the liberal spirit in which they had been met by the Minister of Public Works, and the various officials of the Department under whose special supervision the Company carried on their business. In conclusion, he referred to resolutions to be submitted at a special meeting, and which are alluded to later in the report of the proceedings.

Mr. A. F. PHILLIPS (Managing-Director) seconded the motion, which was unanimously carried.

The CHAIRMAN then proposed the declaration of a final dividend of 5 per cent., free of income-tax; making a total distribution of 8 per cent. for the year.

Mr. A. M'KERROW seconded the motion, which was adopted.

Proposed by Mr. PHILLIPS, and seconded by Mr. LIDERGWOOD, the Chairman (the Director retiring by rotation) was re-elected.

Dr. W. L. STRAIN, in proposing the re-appointment of the Auditors (Messrs. Cash, Stone, and Co.), took the opportunity of remarking that, as an old San Paulo man, it had given him pleasure to hear the account by the Chairman of the prosperity of the Company. As one who had watched the growth of the city for nearly twenty years, he must say it was greatly to the credit of the Company that the Directors had foreseen the requirements of the inhabitants; and it was owing to this that he could testify to the Company's popularity in the city.

Mr. PARTRIDGE seconded the resolution, which was unanimously carried.

The CHAIRMAN, in proposing a vote of thanks to the officers and staff, said that the Directors were ably seconded by their Secretary on this side, and in San Paulo they were fortunate in having Mr. Gray and Mr. Whyte as, respectively, their Manager and Engineer.

Mr. PHILLIPS, in seconding, remarked that he could personally testify to the devotion to the Company's business of Mr. Gray and Mr. Whyte.

The motion was heartily passed.

Mr. E. CLARK remarked that the shareholders were about to consider an alteration in the Articles of Association, which would make permanent on a higher scale the honorarium to their Directors. Meantime he hoped they would accord him the same support as last year in proposing that a special grant of £250 be made, in addition to the sum authorized by the Articles of Association, in respect of the services of the Directors during the past year.

Mr. PARTRIDGE seconded the resolution, which was heartily agreed to.

The CHAIRMAN, on behalf of himself and colleagues, made suitable acknowledgment.

New Capital and the Articles of Association.

A Special Meeting was then held, at which a series of proposals were considered, increasing the capital of the Company and making certain changes in the Articles of Association. The resolution referring to the capital increases it by £400,000, by the creation and issue of 15,000 of new 6 per cent. preference shares of £10 each; and among the alterations in the Articles of Association is one which advances the Directors' fees from £1000 to £1250.

The resolutions were passed on the motion of the CHAIRMAN, seconded by Mr. PHILLIPS. It was explained that the whole of the new capital would not be issued at once, but as required, and that the shares would be issued to the shareholders at par.

A vote of thanks to the Board concluded the proceedings.

The Haslingden Union Gas Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for the reconstruction of their existing retort-bench. The work consists of four through arches with eight settings of nine retorts, and includes the whole of the retort-mountings. It has to be carried out under the supervision of Mr. R. B. S. Houghton, the Company's Engineer.

A COAL BREAKER AND A FATAL ACCIDENT.

A fatal accident that, in its details, is fortunately exceptional occurred at the East Greenwich works of the South Metropolitan Gas Company last Thursday morning. It is not too much to say that the accident is the worst that has ever been experienced at East Greenwich; and, in fact, nothing more terrible could have happened. The matter is also referred to in a paragraph in an earlier part of this issue (p. 14). It appears that two men were engaged trimming coal into the hopper of a coal-breaker in one of the coal-stores. About 7 a.m., the two men were removing a plank, when one of them—John Bowen Brooks—stumbled into the hopper in some extraordinary way. His comrade heard a shout; and, on looking round, saw Brooks standing upright in the hopper. The comrade threw down his end of the plank, rushed to the lever controlling the gas-engine which drives the breaker, and shut off the gas. But it was too late; and the whole of the poor fellow's body passed through the crusher, and was reduced to a pulp. The inquiry by the Coroner (Mr. H. R. Oswald) was held on Saturday; and the evidence showed that Brooks had been employed at the works a great many years, and was therefore a competent workman. The inquest proceedings occupied only a short time, as, on the evidence, there was no difficulty in pronouncing a verdict of "Accidental death." There was a guard round the hopper; and the protection provided has been found by the Factory Inspector who visited the scene of the accident as being quite in conformity with the requirements of the Act.

Curiously, there was another death about the same hour at the works; but in this case, a physical trouble was the cause. The man's name was Samuel West; and only a few minutes before his collapse, he had been speaking to a fellow worker about the boat-race.

TOWN GAS FOR CHEAP POWER.

Experience in East London.

In another part of the "JOURNAL," reference is made to a very effective *brochure*, issued by the Commercial Gas Company, setting forth the advantages of town gas as a source of power. The following are some of the particulars furnished.

The first thing to strike the eye, on opening the large folding sheet of which the booklet consists, is the statement, in prominent characters, that electrical power is three times more costly than gas power. This is an important fact to be borne in mind in these days, when, as the compiler (presumably the Company's Engineer, Mr. Stanley H. Jones) says "the stress of competition demands that every effort shall be made to effect economy in production." It has evidently been borne in upon Messrs. Hacker Bros., of Old Ford, who have effected a saving of £3 5s. 3d. per week by substituting a "Stockport" gas-engine for an electric motor. Here are the figures:

Electric current for 11 weeks, at 1·8d. per unit . . .	£54	9	5
Gas for 12 weeks, at 2s. 3d. per 1000 cubic feet . . .	20	5	5
Electricity averaged £4 19s. 0d. per week.			
Gas ,, 1 13 9 ,,			
Saving by gas . . £3 5s. 3d. per week.			

In addition to this substantial economy, the gas-engine is about double the power of the electric motor.

Evidence is next adduced in support of the statement that steam power is twice as costly as gas power. It is furnished by Messrs. T. & W. Cole, Limited, of Park Road Iron-Works, who saved in one year more than £200, or about 55 per cent., as the result of displacing steam by gas engines. The steam plant consisted of a 12 H.P. steam-engine driving the works; a 6 H.P. high-speed steam-engine driving the dynamo for lighting; and a vertical tube boiler of 100 lbs. working pressure. The gas plant was a 25 B.H.P. "Campbell" gas-engine driving the works and dynamos for lighting. The following are the running costs:—

Steam (year 1903)—		
Coke	£271 2 11	
Wages	91 0 0	
		£362 2 11
Gas (year 1904)—		
Town gas	£110 9 0	
Wages.	45 10 0	
		155 19 0

Saving in one year, £206 3s. 11d.

Messrs. Ellis and Co., of Limehouse, effected a saving of 57 per cent. by putting in a 22½ B.H.P. "Stockport" gas-engine in place of an 8 H.P. steam-engine. Their running cost for a year with the steam-engine came to £133; whereas with the gas-engine it was £57—thus showing a saving of £76.

In the last fold of the sheet are set forth the great advantages of town gas compared with suction gas. The troubles arising from the use of the latter are dwelt upon by Mr. W. H. Burchell, the Director and Manager of the Caxton Press, Limited, of Furnival Street, E.C. He states that, owing to the unpurified state of suction gas, their engines have to be cleaned much more frequently. The supply is so irregular as to often dislocate their working arrangements; making the output of the machinery most unreliable. He finds that town gas avoided setting apart any area, buildings, boilers, or chimney shaft, and thus saved the capital expenditure upon plant, which in turn involved running charges for labour, wear and tear, depreciation, and interest on capital—items which were generally overlooked in computing the cost of suction gas. The fact that suction gas was only about one-fifth the power of town gas, and that the former could not be used for lighting purposes, was also found to be a great drawback. These remarks are followed by the testimony of Mr. Samuel Cutler, jun., of Millwall, that there is no actual economy in using producer gas rather than ordinary coal gas, which is at our doors, and the employment of which is not attended by any stand-by losses, blow-off, or nuisance. Finally, the experience of another printer, as recorded in the "British Printer," is given. He has found that electricity is not cheaper than gas, hour for hour, and the horse power the same; and he is sure that "many an employer would go back to his gas-engine, if he were not restrained by a signed agreement for a number of years with the electrical supply authorities, and want of space."

The Company's current rates of discount for gas-engine supplies range from 10 to 20 per cent.; and so well has this branch of the business been pushed that they sell a million cubic feet of gas daily for power purposes alone.

IPSWICH GUARDIANS AND THE GAS COMPANY'S ASSESSMENT APPEAL.

In proposing the adoption of a report by the Assessment Committee with reference to the Clerk's remuneration, the Chairman of the Ipswich Board of Guardians (Mr. A. Sizer) said they had dealt with 5000 appeals during the last two years. The Committee had been subjected to a great deal of criticism; but they had tried to deal fairly, and on its merits, with every case brought under their notice. This had not, perhaps, been rewarded with much gratitude. One gentleman, in fact, recommended that each member of the Committee should be taken by the scruff of the neck and thrown into the dock. There had been one important case during the past year, which had cost the town a considerable amount of money. He regretted that it had to be fought; but there was no alternative so far as that Board were concerned, seeing that all attempts at conciliation on the part of the Overseers, and also on the part of the Assessment Committee, had failed. Sir Daniel Goddard stated, at the Gas Company's meeting, that they had won the appeal. That was the case, no doubt; but they had not exactly won all along the line. An increased assessment had been put on their undertaking of £120; and this would yield an income of about £48 a year. But it was practically decided that the 17½ per cent. deduction in respect of tenant's capital invested in slot-meters and gas-stoves was excessive. Upon taxation, their bill of costs was reduced from £821 to £295. The Board had been blamed for fighting the case; but he held that they could do nothing else.

STREET LIGHTING ECONOMY IN NEWCASTLE.

The Watch Committee of the Newcastle Corporation, at a special meeting held to consider the question of reducing the estimates by £1000, in accordance with the proposition of the City Council, decided, after a long discussion, to postpone the lighting of Westgate Road extension by electricity. This will effect a saving of £180. It was also agreed to reduce the estimate of £687 for new gas-lamps (principally for the outlying districts) by £387. The maintenance account was reduced by £180. The Deputy Lord Mayor (Mr. Alfred Appleby), who presided, took strong exception to any reduction in the number of new gas-lamps, especially those intended for the outskirts of the city. He said he considered that these places, if not properly lighted, would be a source of danger to the public. It was true that many of their thoroughfares were costing the city an immense sum for what some ratepayers considered an excessive amount of lighting by electricity. In the interests of true economy and efficiency, he urged that the two important items relating to new gas-lamps and maintenance should be allowed to stand, and a saving effected on the electric light. The feeling was expressed that the question raised by the Deputy Lord Mayor should be thoroughly gone into.

LANCASTER CORPORATION GAS SUPPLY.

The Past Year's Progress—Reductions in Price.

At the Meeting of the Lancaster Town Council last Wednesday, the minutes presented by the Gas Committee set forth that the Engineer (Mr. Charles Armitage, Assoc.M.Inst.C.E.) had submitted a statement showing the quantity of gas made since the undertaking passed into the hands of the Corporation in 1880, and the price per 1000 cubic feet charged. It was resolved that the Council be recommended to reduce the price to 2s. 1d. per 1000 cubic feet, less 2d. discount, for ordinary meters, except for motive power, and to give users of prepayment meters 3 cubic feet extra for 1d. in the future; also that gas for motive power be charged for on a sliding-scale according to the consumption, varying from 1s. 4d. to 1s. 9d. per 1000 cubic feet—the reduction to date from the March readings of the meters. The Engineer had reported as to a system of giving receipts to users of prepayment meters, and it was resolved that the matter should be referred to a Sub-Committee, with power to adopt the system if found satisfactory. The estimates of the income and expenditure of the Committee for the year ending March 25, 1909, were submitted, and, as amended, approved for presentation to the Finance Committee.

In moving the confirmation of the Committee's proceedings, Alderman Helme said, with regard to the collection of the money from prepayment meters, it was suggested that a receipt should be handed to the users. The Committee were quite willing to accept any suggestion for a stricter taking of accounts; and though this would cause some expense, it would be considered by a Sub-Committee, who had power to deal with it. The accounts for the year showed that there had been a steady and progressive increase in the quantity of gas produced and sold; the quantity for the year—210 million cubic feet—being 10 millions more than for the previous year, while the increased sale had considerably aided the financial position of the Committee. At the beginning of the year, they estimated that the sales would amount to £18,835, but they had reached £19,725—a rise of £890; while there was an increase from the sales of coke, &c., of £1124. They had not

expended quite all the money estimated on coal, cannel, &c., the amount being £12,623, against an estimate of £12,862; but other items in the expenditure came out much as provided for, with the exception that in extending mains to new parts of the town they had spent £1378 against an estimate of £1000. The year's working showed an increased profit over what was anticipated. They had looked for a balance of £2000 to be contributed to the local chancellor of the exchequer for the relief of the rates, in addition to which they had provided, free of charge, for the public lighting of the town, gas of the value of £1700—making a total contribution of £3700 for the year. After putting aside this large amount, however, they had still a surplus profit of £1707; and as the result of an interview he had with the Chairman of the Finance Committee, he was glad to say the Gas Committee, rather than see the rates increased, had willingly consented to a further sum of £500 being applied to their relief. This left a sum of £1207, which would be carried to the reserve fund, bringing it up to £10,770. Out of their profits of £5407, they had contributed to the town the substantial sum of £4200. With the result of the year's working before them, the Committee felt it was their duty to continue the policy of supplying gas at the lowest price that could reasonably be fixed, having regard to the joint interests of the consumer and the Corporation. With the steady development of the capital value of the undertaking, they felt that justice had been done to the interests of the ratepayers; and at the same time, by reductions in price, they had endeavoured to meet the convenience of consumers. Whenever they had been able to reduce the charge for gas, a larger quantity had been used; and in prepayment meters and cookers they were offering to the occupiers of cottage homes facilities for greater comfort at the lowest cost. The Committee now asked the Council to sanction a reduction in the price of gas to 2s. 1d. per 1000 cubic feet, with 2d. cash discount for ordinary consumers except for motive power, and in future to give users of prepayment meters 3 cubic feet extra for 1d. This reduction and the cost of altering the prepayment meters would involve a sum of £1147. But the Committee anticipated that at the end of the year, in addition to handing over £2000 for the rates, they would have a balance of £1997; so that after deducting the £1147 they would still have £850 to go to the reserve fund. Altogether, the gas undertaking was in a very satisfactory financial condition; and he desired to acknowledge the services of the Engineer and Manager, whose skill and efforts, under the direction of the Committee, had produced such excellent results.

In seconding the motion, Alderman Bowness complimented Mr. Armitage. He said the Corporation were blessed with a clever and intelligent Manager; and it was to him they were greatly indebted for the success that had followed the spirited policy which the Council allowed the Gas Committee to inaugurate two or three years ago.

Mr. Wright said he did not think the Committee should allocate more than £2000 out of the gas undertaking towards the rates, because it was the gas consumers who ought principally to benefit; and by appropriating large sums in reduction of the rates they were relieving many large concerns who provided their own light and did not consume gas. Alderman Helme said the Committee had carefully considered all interests, and tried to prevent any increase in the rates at the present time. The contribution to the rates for next year was put down at £2000, and not at £2500.

The minutes were then confirmed.

STOCKPORT GAS PROFITS AND THE RATES.

At the Monthly Meeting of the Stockport Town Council last Wednesday, it was reported that the Gas Committee had resolved that for the year ending the 31st ult. the sum of £15,000 should be handed over to the Finance Committee in aid of the rates.

When the minutes of the Gas Committee came before the Council, Mr. Brewster claimed that the profits of the Gas Department were unequally distributed among the ratepayers of the town. There were large manufacturers and others who had put down their own gas plants, and did not consume any of the Corporation gas. These people, therefore, did not help in any way to produce the profits. A sum of £15,000 represented something like 9d. in the pound on the rates; and those who did not consume any gas ought not to share in the profits, as they did at the present time. He contended that, instead of utilizing this profit in aid of the rates, the price of gas should be reduced to the ordinary consumers. The Stockport Gas-Works stood excellently in management, capital, and everything else; so that there were no grounds for anyone to say that the department was not producing the profit it should considering the magnitude of it. Stockport, with regard to the manufacture and the finances of its Gas Department, stood as one of the best towns in England. He moved as an amendment that the price of gas be reduced 3d. per 1000 cubic feet, and that automatic meter users be allowed a reduction in the same proportion; but on the Mayor refusing to accept the amendment, Mr. Brewster moved that the Gas Committee's minutes be passed save and except the one relating to the profits. He said they would not be carrying out the main principle which they were sent to the Council to uphold—that the profits of the various departments of the Corporation should be equally distributed among the ratepayers of the town. He brought this matter forward in the interests of the gas consumers of the town.

In seconding, Mr. Linfoot claimed that the distribution of the gas profits affected the workers, and that they were not disbursed in an equal manner. The price of gas ought to be largely reduced to the ordinary consumers. The Gas Committee had certainly carried on their undertaking very well and very successfully; and they had made a considerable amount of money.

Mr. M'Gregor said that it might be considered whether they could dispose of the profits of the Gas Department to any better purpose than at present. He pointed out that though they had a monopoly of the supply of gas, they could not compel people to use it. Mr. Forster was of opinion that there were sufficient reasons why the £15,000 should be handed over to the rates. Alderman Ferns, also, urged that the ratepayers were the owners of the gas-works, and surely the whole of the owners of the undertaking were entitled to any benefit there was out of the gas profits. The most equitable and easiest way to distribute the profits was to distribute them equally among all the ratepayers according to the rates they paid. He did not understand the argument that was used, that the profits should be distributed among the small consumers in some way. This argument carried no weight; and he was certain the best course was being adopted.

The Chairman of the Gas Committee (Mr. Fernley) remarked that this was a little hardy annual of Mr. Brewster's. On the last occasion, he (Mr. Fernley) said the sun shone on the just as well as on the unjust. He did not wish to repeat this; but he wanted to point out that the gas undertaking belonged to the ratepayers, and not to the gas consumers. The larger the ratepayer, the larger the shareholder in the undertaking; and because they did not consume gas, there was no reason why they should not benefit in the profits. In the event of a large loss being made on the gas undertaking, there would be a rate levied on the whole of the ratepayers, and not on a section. Mr. Brewster might just as well argue that people who did not have their children educated in the free schools ought not to pay the education rate. The best way to distribute the gas profits was as they were now doing—in the reduction of the rates.

On a vote being taken, 10 voted for Mr. Brewster's amendment and 36 against—which led Mr. Fernley to remark: "Your supporters are growing, Mr. Brewster. Try again in another 25 years."

GAS-METER TESTING IN LONDON.

Annual Report of the Inspector.

We have received from Mr. James Stratford, the Inspector of Gas-Meters for the City of London, his report to the County Purposes Committee of the Corporation on the work of the past year.

Mr. Stratford opens his report with an expression of satisfaction at the further increase in business which took place in the twelve months ending the 31st of December. He says that much care and constant attention are used to this end, always bearing in mind the fact that the office has been established to carry out the provisions of the Sale of Gas Acts, to ensure justice between gas consumers and gas companies, to prevent fraud, and to correct the accidents of manufacture. It is not a business intended or worked to show a profitable return. A tabular statement of the meters tested and the fees received in the past six years shows that the figures have risen from 55,198 meters tested and £1806 paid in fees in 1902 to 80,703 meters and £2474 fees last year; the latter figures being increases of 3076 meters and £73 fees compared with the year 1906. The testing fees do not rise in proportion to the number of meters received, owing to the development of the trade in prepayment meters and small householders cooking by gas. The meters used for this purpose are, of course, all small; so that no less than 65,603 meters were tested at the minimum charge of 6d. each, though they required as much care and time as those of larger size and fee. There were altogether 79,067 dry meters tested last year; among them being 2578 20-light, 9646 10-light, 25,423 5-light, and 38,780 3-light. Of the 1636 wet meters tested, 455 were 10-light, 492 were 5-light, and 518 were 3-light. The total number of meters dealt with (80,703) is divided as follows: New meters, 36,504; meters repaired, 36,581; meters with disputed registration, 7618. There were 41,107 prepayment meters tested; 8062 being 5-light and 32,614 3-light. Mr. Stratford states that stop meters are in much favour with some gas companies, and about 1000 a year are tested in his office. The number of new and repaired meters rejected last year was 1964, of which 401 registered fast, 552 slow, 337 were leaky, and 274 passed unregistered gas. The statement of the number and condition of disputed meters, of which 7618 were tested, is as follows: Correct in registration, 2997; incorrect, 3327; faults recorded, 9231; registered fast, 1413; registered slow, 1914.

In the course of the general remarks at the close of the report, Mr. Stratford says some gas companies have well-fitted testing-rooms, and meters removed from their mains are taken first to district offices, and thence, by van or otherwise, to the gas-works, and are tested before being sent to the meter inspectors. The meters so carried from place to place are then put under various tests, and may be quite altered in registration from their condition when removed from the premises of the consumers, who may be at a great disadvantage from this cause. Mr. Stratford submits that the officially appointed inspector should first test the meter as soon after its removal from work, and with as little disturbance by carriage, as possible. He states that there is still a tendency with some gas companies to take advantage of the Act by sending meters for testing that are found to be slow in registration, and to surcharge the consumer by means of the certificate; and where the meter is fast in registration, the consumer having no knowledge of it, there is reason to fear that the fact is suppressed. This, he says, "is a growing evil, caused by undue pressure upon those responsible for the distribution of gas to reduce loss from leakage and other causes." The Sale of Gas Act does not give the inspector any control over this fault; nor does it contain any provision for testing the correctness of gas-meter indices beyond the test-dial; and Mr. Stratford says "a satisfactory method is needed before such testing can be effectively carried out, as each index must be carefully tested by hand before being fixed in the meter by the maker. Not only the wheels of the index, but the templet of the dial, the position of the dial, and the index hands and pinions must all be examined to ensure correct working at all points of the dial—making this a very difficult work." He adds that the mechanical errors in meters are very few, and, with improved methods of manufacture and machinery in use, are now barely possible. The testing would throw a burden of many thousands of pounds upon gas consumers or ratepayers, and "the public have had no cause to desire such testing."

Messrs. Brotherton and Co., Limited, ammonia and tar distillers, who for the past twenty-five years have had their central offices at Commercial Buildings, have removed to City Chambers, Leeds.

FRASERBURGH TOWN COUNCIL AND THE GAS-WORKS.

In the "Electricity Supply Memoranda" in the "JOURNAL" for the 24th ult., reference was made to a scheme which was before the Town Council of Fraserburgh for lighting the burgh by electricity generated by plant working in conjunction with a dust-destructor. The circumstances which led to the initiation of the scheme were as follows: About this time last year, the Town Council resolved unanimously, at a special meeting, to adopt the Burghs Gas Supply (Scotland) Act, 1876, with the view of acquiring the undertaking of the Fraserburgh Gas Company; and towards the close of the year another meeting was held to confirm the resolution. On the suggestion of the Provost, however, it was decided to obtain information as to whether it would not be better and cheaper for the community to introduce electric lighting, and leave the Gas Company alone. A Committee was appointed to consider the matter; and they enlisted the services of Mr. W. B. M'Lusky, of Perth, to deal with the Gas Company, of Mr. H. Richardson, of Dundee, to furnish information as to electric lighting, and of the Burgh Surveyor (Mr. W. Alexander, B.Sc.), to report on the merits of a dust-destructor. Mr. M'Lusky, in the course of his report, stated that, as he was not allowed to inspect the Company's works or books, his estimates were only approximate. He reckoned that the structural value of the works and distributing plant, including £4518 for a new holder and a trunk main, was £14,415; and the outlay of £1000 would put the works in a condition to deal efficiently with the demand for gas for five years. He estimated the average annual profits for the three years to Whitsunday, 1907, at £1500; and the capital employed was £12,000. After paying dividends, there would be a balance of £550, which he assumed was put into the business; so that the consumer was providing capital as well as dividend. Municipal control, in his opinion, would be an advantage to the town and a benefit to the gas consumers. If the undertaking cost £15,000, the present estimated profits would meet the fixed charges, and effect a reduction in price of 8d. per 1000 cubic feet. Mr. Richardson reported that the possibility of establishing a profitable and satisfactory generating station driven from a dust-destructor was immediately apparent on surveying Fraserburgh, which was just the sized town, both in population and in area, for the scheme to be "certain of success;" and he submitted a balance-sheet showing the capital cost of such an arrangement, and the revenue therefrom. With an outlay of £8732, he made out that there would be a balance of £1015, after allowing for interest and sinking fund charges and meeting the expenses of working. He gave a list of seven towns in which refuse and dust destructors are operating in conjunction with electricity stations. Mr. Alexander, as the outcome of visits to Clydebank and Cambuslang, where destructors combined with electric lighting plant are at work, submitted plans and an estimate of works suitable for Fraserburgh, and said that, in the interest of the inhabitants, the question of adopting them was worth the consideration of the Committee and the Council.

The Committee gave these reports full consideration, but could not agree among themselves as to what to recommend the Council to do; and when the matter came before this body at a special meeting on Monday last week, the Convener of the Committee (Mr. E. Gordon) simply moved that the resolution previously passed as to adopting the Burghs Gas Supply Act should be confirmed. On Provost Finlayson asking if this was all he had to say, he replied that it was—in the meantime. The motion having been seconded, Bailie Gordon criticized the report submitted by Mr. M'Lusky, who, he said, had calculated the Gas Company's profits on the erroneous basis of 4s. 7d. per 1000 cubic feet of gas, which was not by a long way the price charged by the Company in the year taken. In that period the price was only 4s. 2d. to the ordinary consumer, to those who used engines it was 3s. 9d., and to the town it was 2s.—making an average price (1906-7) of 3s. 8¼d. What reliance could the Council place on a report based on so erroneous a foundation? They had been deceived into believing that the community of Fraserburgh were paying 1s. per 1000 cubic feet more for their gas than they actually had been doing. Mr. Will submitted that the matter out of which Bailie Gordon was endeavouring to make so much capital did not represent more than £300.

The Provost expressed regret at having to move a direct negative. He strongly preferred the introduction of the electric light in combination with a dust-destructor; but he did not mean to proceed at once to do this, for reasons which he gave. He thought that both the acquisition of the gas-works and the installation of the electric light should be left alone until they saw what developments would take place. It was not right to pledge the community too deeply, as it seemed to him they were doing. Though he believed the gas supply should be under the control of the Town Council, he thought it was inexpedient now to take any steps to acquire it. Bailie Cow seconded the amendment, and said that, as one of the Special Committee, he had gone into the matter thoroughly. He had not changed his opinion in favour of the principle of the municipalization of the gas undertaking, but had modified it in regard to whether it would be the right thing to take over the gas-works at the present time. He considered the municipal control of the works would not be an advantage to the town nor a benefit to the consumers. Mr. Cumming emphatically supported the amendment. He said he believed in municipalization generally; but Mr. Gordon had not made out a case for it. It would be of no advantage to the community to take over the gas-works.

Mr. Gordon, in reply, said it was not to be wondered at that there were discrepancies in Mr. M'Lusky's report, as he was not allowed to look into the gas-works. He went on to criticize the statements and figures contained in Mr. Richardson's report, and said that if their expert was not more accurate in regard to things he (Mr. Gordon) did not know than he was in respect of those he did know, he was altogether wrong. He (the speaker) held that the electric lighting scheme proposed was impracticable. Not two-thirds of the population used gas; and he was sure not 5 per cent. of the occupants of the houses would take electric light. Were they to introduce it for the benefit of 5 or 10 per cent. only of the community? It would not be fair to do so. The success of electric lighting apparently depended upon its alliance with a dust-destructor. In Hackney and Fulham, where there was this combination, there was a dead loss. There was not a town in Scotland where electricity had been installed which paid. Personally, he should like to see electric lighting. But it was not what he would like to see; it was what he considered to be in the interest of the community. In his opinion, the electric light would never pay in Fraserburgh.

After some further remarks, a vote was taken, when five voted for the motion and three for the amendment. As the former was not supported by a two-thirds majority of those present, it was declared lost.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 16.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 11	10†	Alliance & Dublin 10 p.c.	20—21	..	4 15 3
268,324	10	,,	7†	Do. 7 p.c.	14—15	..	4 13 4
310,000	Stk.	Jan. 16	4	Do. 4 p.c. Deb.	100—103	..	3 17 8
200,000	5	Oct. 30	6½†	Bombay, Ltd.	6½—6¾	..	4 16 4
40,000	5	,,	6½†	Do. New, £4 paid	4½—5	..	5 4 0
50,000	10	Feb. 27	14	Bourne-mouth Gas and Water { 10 p.c. / B 7 p.c. / Pref. 6 p.c.	27—28	..	5 0 0
51,810	10	,,	7		16½—16⅝	..	4 3 7
53,200	10	,,	6		14—15	..	4 0 0
380,000	Stk.	,,	12½	Brentford Consolidated	242—247	..	5 1 3
300,000	,,	,,	9¼	Do. New	180—185	..	5 2 8
50,000	,,	,,	5	Do. 5 p.c. Pref.	118—123	..	4 1 4
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	100—105	..	3 16 2
220,000	Stk.	Mch. 12	11½	Brighton & Hove Orig.	195—205	..	5 9 9
246,320	,,	,,	8½	Do. A. Ord. Stk.	152—157	..	5 5 1
460,000	20	Mch. 27	10	British	42—43*	..	4 13 0
104,000	Stk.	Feb. 13	6	Bromley, Ord. 5 p.c.	116—119	..	5 0 10
165,700	,,	,,	4½	Do. do. 3½ p.c.	86—89	..	5 1 2
500,000	10	Oct. 11	7	Buenos Ayres (New) Ltd.	11¾—12	..	5 16 8
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	Mch. 12	7½	Cagliari, Ltd.	25—26	..	5 11 6
100,000	10	—	—	Cape Town & Dis., Ltd.	4—6	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	7—9	..	5 0 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	48—50	..	6 0 0
103,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	92—94	..	4 15 9
157,150	Stk.	Feb. 27	5	Chester 5 p.c. Ord.	105½—107½	..	4 13 0
1,493,280	Stk.	Mch. 12	5⅝	Commercial 4 p.c Stk.	103—108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	100—105	..	4 15 3
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	82—84	..	3 11 5
800,000	Stk.	,,	6½	Continental Union, Ltd.	115—120	..	5 8 4
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	..	4 16 7
460,170	Stk.	—	5½	Derby Con. Stk.	122—123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,915	,,	—	—	East Hull 5 p.c. Ord.	100—103	..	—
486,090	10	Jan. 30	12	European, Ltd.	23—24	..	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	16½—17½	..	5 2 10
15,182,590	Stk.	Feb. 13	4⅛	Gaslight and Coke { 4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb.	96—98	+1	4 9 9
2,600,000	,,	,,	3½		87—90	+½	3 17 9
3,799,735	,,	,,	4		106—109	..	3 13 5
4,193,975	,,	Dec. 13	3		83—85	..	3 10 7
258,740	Stk.	Mch. 12	5	Hastings & St. L. 3½ p.c.	93—93	+2	5 2 0
82,500	,,	,,	6½	Do. do. 5 p.c.	112—115	..	5 13 1
70,000	10	Oct. 11	11	Hongkong & China, Ltd.	19—20	..	5 10 0
4,940,000	Stk.	Nov. 14	8	Imperial Continental	178—180	..	4 8 11
473,600	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	93—95	..	3 13 8
195,242	Stk.	Mch. 12	6	Lea Bridge Ord. 5 p.c.	113—118	..	5 1 8
561,000	Stk.	Feb. 27	10	Liverpool United A	221—223	+1	4 9 8
718,100	,,	,,	7	Do. B	161½—163½	..	4 5 8
306,083	,,	Dec. 30	4	Do. Deb. Stk.	106—108	..	3 14 1
152,736	Stk.	Feb. 13	7⅝	Maidstone 5 p.c.	136—141	..	5 8 2
75,000	5	Nov. 28	5	Malta & Medn., Ltd.	4¾—4⅞	..	5 5 3
560,000	100	Apl. 1	5	Met. of { 5 p.c. Deb.	100—102*	+1½	4 18 0
250,000	100	,,	4½	Melbourne { 4½ p.c. Deb.	99—101*	+¾	4 9 1
541,920	20	Nov. 14	3½	Monte Video, Ltd.	10½—11½	..	6 1 9
1,775,892	Stk.	Feb. 27	4⅜	Newc'tle & G'tesh'd Con.	106—107	..	4 6 5
418,460	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	87—88	..	3 19 7
15,000	10	Feb. 27	10	North Middlesex 10 p.c.	20—21	..	4 15 3
55,940	10	,,	7	Do. 7 p.c.	13½—14½	..	4 16 7
300,000	Stk.	Nov. 28	8	Oriental, Ltd.	142—145	..	5 10 4
60,000	5	Mch. 27	7	Ottoman, Ltd.	6—6¼*	..	5 7 8
398,490	5	Oct. 30	7	Primitiva Ord.	6¼—7	..	5 0 0
796,980	5	Jan. 30	5	Do. 5 p.c. Pref.	4⅝—5⅛	..	4 17 7
488,900	100	Dec. 2	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
1,000,000	10	Oct. 11	8	River Plate Ord.	13⅜—14	..	5 14 4
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Sept. 27	8	San Paulo, Ltd.	13½—14	..	5 14 4
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	49—51	..	4 18 0
135,000	Stk.	Mch. 12	10	Sheffield A	244—246	+1	4 1 4
209,984	,,	,,	10	Do. B	244—246	+1	4 1 4
523,500	,,	,,	10	Do. C	244—246	+1	4 1 4
70,000	10	Nov. 14	10	South African	14½—15½	..	6 9 0
6,429,895	Stk.	Feb. 13	5⅜	South Met., 4 p.c. Ord.	121—123	..	4 6 8
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	83—85	..	3 10 7
209,820	Stk	Mch. 12	8	South Shields Con. Stk.	154—156	..	5 2 7
605,000	Stk.	Feb. 27	5⅜	S'th Suburb'n Ord. 5 p.c.	116—119	..	4 9 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	118—121	..	4 2 8
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
502,310	Stk.	Nov. 14	5	Southampton Ord.	107—112	..	4 9 3
120,000	Stk.	Feb. 27	6¾	Tottenham { A 5 p.c. / and B 3½ p.c.	120—125	..	5 8 0
398,940	,,	,,	5¼		101—104	..	5 1 0
149,470	,,	Dec. 13	4	Edmonton { 4 p.c. Deb.	99—102	..	3 18 5
182,380	10	Dec. 30	8	Tuscan, Ltd.	10¼—10¾	..	7 8 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	98—100	..	5 0 0
193,742	Stk.	Feb. 27	5	Tynemouth 5 p.c. max.	105—107	..	4 13 6
255,636	Stk.	Feb. 13	6½	Wandsworth and Putney { B 3½ p.c. / 3 p.c. Deb. Stk.	128—133	..	4 17 9
80,075	,,	Dec. 30	3		73—78	..	3 16 11
845,872	,,	Feb. 27	5⅛	West Ham 5 p.c. Ord.	101—104	..	4 18 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	118—120	..	4 3 4
228,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	102—107	..	3 14 9

† Next dividend will be at this rate. Prices marked * are "Ex div."

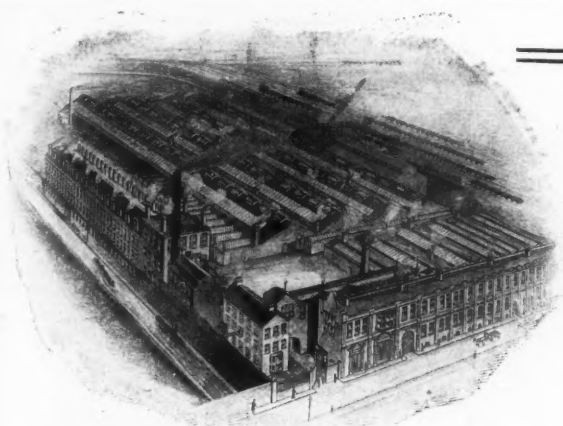
ANTWERP WATER-WORKS COMPANY.

The Expiring Concession.

Presiding at the Annual Meeting of this Company, Mr. Easton Devonshire submitted a report from the Directors which showed that the income from all sources during last year amounted to £73,908, as compared with £67,399 for 1906; and, after deducting working expenses, the cost of laying on services, and London expenses, there is a balance of £47,744. To this is added the undivided profit of £3253 brought forward, and interest on investments £295, making a total credit of £51,293. Against this have been charged debenture interest and income-tax for 1907, the contribution to the reserve account of 5 per cent. on net profits, the interim dividend of £12,750, at the rate of 8½ per cent. per annum, the transfer of £1900 to the sinking fund for redemption of debentures, and for that of the share capital, £6250, and the Directors' extra remuneration under Article 118, of £1731. The sum of £21,377 is then left, out of which the Directors recommended that a balance dividend for the six months to Dec. 31, 1907, be paid at the rate of 9 per cent. per annum, free of income-tax—absorbing £13,500, and making a total dividend of 8¾ per cent. for the year. The balance to be carried forward is £7877.

In the course of his remarks, the Chairman alluded feelingly to the resignation from the Board, through advancing years, of Mr. G. F. Smith, and to the election to the vacancy of Mr. W. E. Darwin, who has had experience in water-works administration through his connection as Director and Chairman of the South Hants Water-Works Company. Regarding financial matters, the gross income had increased in the year by rather more than £4000. This was principally made up by £2302 on the general supply, by £1601 on the shipping supply, and by £95 on the meter connections. The increase in the general supply was remarkable. They had added 1545 consumers to rental, which was a record in the history of the Company. The shipping supply increase was also most satisfactory, and indicated perhaps more than any other figure the growing prosperity of Antwerp. In his speech at the previous meeting, he warned the shareholders not to expect a continuance of the exceptional income derived from meter supplies, which, in 1906, was due to unusual conditions; but he was glad to point out that there had been the further increase of £95. As some set-off against the increase of income, they had had to meet increased expenditure; the principal item under this head being the charge for coal. In 1906, they were still pumping rather more than half the water from the Waelhem pumping-station; but in 1907 they were using the two stations—the second as a reserve—over the whole of the period. This double pumping was economical in the long-run by the avoidance of an increase in the filtration plant at Waelhem, and the necessity for a supplementary main. Then, again, coal had increased in price; the average increase being 4 frs. per ton, which was a serious item. Besides this, the consumption of water had also increased by 271,201 cubic metres in the year. Coal was by far the largest item in the increased expenditure, amounting to nearly £900 of the total increase. In view of the higher price of coal, the Directors had decided to spend further capital at Waelhem in bringing their boilers up to date—getting rid of the old low-pressure boilers, and putting in high-pressure ones. Their Consulting Engineer advised them that they would save some £690 in their coal bill by doing this. The capital expenditure on the alterations would amount to about £4000; so that the money would be well spent. They were also going to incur further capital expenditure, to the extent of about £5000, in erecting a plant of gravel strainers, or preliminary filters, through which the water would pass before reaching the sand filters. They had made experiments lasting over many months; and these had shown that, by using these strainers, they could dispense with an enlargement of the settling reservoirs, at the same time increasing the output of the present sand filters without extending their area. In other words, the Directors hoped, by means of these strainers, and this expenditure of £5000, to increase by 50 per cent. the capacity of their filtering plant. As to the dividend, they were not dividing the profits up to the hilt, but were carrying forward a substantial sum. This policy was approved by the Auditors; and it appeared to the Board the best to follow, in view of the approach of the date—1911—when the question of purchase or otherwise would be settled. In this way, they would get a little money in hand, without borrowing, which could be spent on the extension of works. The money was there; and the shareholders would get it back sooner or later. The position with regard to what might happen in 1911 was very much as it was twelve months ago. The Directors had not been officially approached in the matter of purchase or of any arrangement for the continuance of their administration of the water supply of Antwerp in lieu of purchase. They learned from the newspapers that a Commission of the Town Council would be appointed to consider the question of purchase. He might say that were it not for the large scope for the future increase of the town, and the supply of water for many years to come, he thought it would not be worth while for the Company to entertain any proposals other than the conditions provided for in the concession; but as there was no doubt that the requirements for water would continue to grow for many years to come, the Company might consider suggestions, if made, for an arrangement by which they should continue to administer the undertaking, and perhaps share part of the increase in profits with the town. The Directors heard of proposals for the demolition of the fortifications and the probable extension of the city. It seemed pretty clear from newspaper reports that had been brought before the Directors by the Secretary (Mr. J. M. Hamilton) that the communes within the fortifications at the present time, which communes the Company supplied with water, meant to stick to the portion of the extension which came into their territory. In any arrangements for the future, this would be a very important consideration for the Company.

The motion for the adoption of the report, having been seconded by Mr. G. Evans, was unanimously agreed to, as were also the various recommendations in the report. Thanks were also tendered to the Chairman and Directors, to M. Ad. Kemna (the Company's Manager at Antwerp), and to Mr. Hamilton (the Secretary).



You Remember

our **No. 1** last week.

We gave **6** telling points for the superiority of this **New Gas-Heated Oven** of ours, over all others for **High-Class Baking and Confectionery.**

Can we assist you in impressing these points upon all likely users in your District, as well as the advantages derived from using this "Brand New" Apparatus?

MORE NEW THINGS FROM ESSEX WORKS.

Here are some Particulars as to its unique construction—

OVEN BRICK-LINED—Sides and Sole.

DOOR, DOUBLE-CASED, Porcelain-Enamel Lined and Packed with Non-Conducting Material.

TWO Wrought-Iron GRID SHELVES are fitted to each Oven.

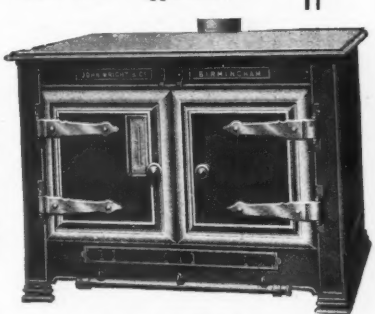
CAST-IRON FLUE OUTLET.

THE OVEN is strongly constructed of Cast-Iron with Panelled Sides. Heated by Three independently-controlled atmospheric Burners, with Supply-Bar in front, and Lighting Door for each Burner.

THE DOOR MOULDINGS and Hinges, also Moulding of Cast-Iron Top, are Polished bright.

THE HEAT is conducted all round Oven by specially arranged Flues, so that no products of combustion come into contact with the Pastry.

EACH OVEN is supplied with independently controlled Gas Pilot Jets.



The "VICTOR."

The "VICTOR" is really . . . . going to popularise Gas for . . . Baking and Confectionery Work.

JOHN WRIGHT & CO.,

BIRMINGHAM.

NEW WATER-WORKS FOR BEXHILL.

Completion of Hazard's Green Scheme.

The Bexhill Water and Gas Company, whose Engineer is Mr. J. Quick, have for some time past been carrying out a new water scheme at Hazard's Green, in order to provide for the increasing requirements of the place and the largely extended area granted to the Company by their Act of 1904. The works are now complete, and trials have been made with the most satisfactory results. In fact, at the recent meeting of the Company, the Chairman (Mr. A. H. Kersey) said the Board felt that they had brought the first step of their scheme for the improvement of the water supply to a successful issue, and looked to the future with the greatest confidence. They hoped the proprietors would not only share this confidence, but congratulate themselves and the Directors on having obtained one of the best supplies of water in Sussex, both as to quantity and quality. The new works comprise a deep well, with borings extending to 240 feet deep; three coke filters; four subsiding reservoirs, holding 500,000 gallons each; three filter-beds, each capable of filtering 500,000 gallons per day; engine-house, with all needful stores, mains, pipes, and connections; a 15-inch rising main to Standard Hill, delivering into a covered high-service storage reservoir, holding 2 million gallons of filtered water, from which the whole of Bexhill can be supplied by gravitation; and a 12-inch gravitation main from the covered reservoir into Bexhill. The engines, pumps, and plant for raising water from the well and pumping to Standard Hill when filtered (all of which are in duplicate) are designed to raise and deliver a million gallons a day each.

STOURBRIDGE WATER PROVISIONAL ORDER.

In the "JOURNAL" for Feb. 25 (p. 478), it was stated that the Stourbridge Water Company were applying to the Board of Trade for a Provisional Order to enable them to extend their limits of supply by including the parishes of Belbroughton and Broome, in the county of Worcester, and to raise additional capital to the extent of £20,000, with borrowing powers to the amount of one-third. An inquiry was held, when objections to the Company's proposals were made by the Councils of Lye and Wollescote, Kingswinford, Amblecote, and Stourbridge, and also by the Parish Council of Belbroughton. The Board of Trade have decided that they are not prepared to authorize the inclusion of Broome and Belbroughton in the limits of supply, but will grant an Order empowering the Company to raise additional share capital not exceeding £7500, with borrowing powers up to one-third of this amount, subject to certain provisions. They decline to put into the Order a clause for sale such as was suggested to them by the Amblecote, Lye, and Kingswinford Councils; and they do not feel it incumbent upon them to express any opinion upon the merits of the proposal contained in the clause. This has reference to the fact that at the time the Company promoted their Order the subject of the acquisition of the undertaking by the Stourbridge Urban District Council was being discussed; and the three Councils named suggested that, if the concern was so acquired, it should be taken over by a Joint Board representing the various Councils of the area supplied by the Company. It is reported that the Company have signified their willingness to accept an Order in the terms now suggested.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The proceedings at the Informal Meeting of Scottish Gas Managers were a great success, owing, there can be no manner of doubt, to the eminence of the President—Mr. G. R. Hislop, of Paisley. The knowledge that he was to be in the chair brought out a larger attendance than usual, which must have been very gratifying to the venerable chief of the Paisley Gas-Works staff. The meeting may be said to have been the occasion of his return to public life; for he has not been much seen in meetings of his brethren, in Scotland at least, for some years. Considering the advanced position he holds in his profession, this was frequently subject of regret; therefore his return is all the more welcome. His presidential address was more of a lecture than a Chairman's speech. It is the custom at the Informal Meeting to discuss the President's address; but on this occasion criticism was out of the question. There was no room for it. The author covered every inch of the ground he occupied so fully, and handled his subjects so convincingly, that to question the soundness of any of his conclusions would have been hopeless. The discussion was therefore wholly of a congratulatory nature, if exception be made of one or two questions which were put, for the purpose of eliciting further information. The subjects selected by Mr. Hislop were few in number. The leading topics may be said to have been five in number—the coal-tax and the Eight-Hours' Bill, vertical retorts, the testing of coal, purification, and a comparison of the costs of gas and electricity. Upon the first there was complete unanimity in condemning the remission of the tax, and almost unanimity in condemning the Eight-Hours' Bill. The other subjects did not lend themselves to discussion. Upon the question of purification, a good deal was said, the moving cause of which was Mr. Hislop's belief in sending the gas down through lime—a system of purification he has followed for many years, and upholds as being more rational, and to give better results, at a cheaper rate, than the almost universal practice of sending the gas up. Though it must have been well known what Mr. Hislop's practice is, it does not appear to be well understood; and there was considerable curiosity on the part of the speakers to learn more about it. For the reasons I have dealt with, there was a greater air of harmony about the meeting than I have ever

...condly, that ...
...-boxes can be ripped op...
...ained, is spreading. So much so has the ... presented a means for plunder without much trouble that men, so it transpired at Birmingham recently, have adopted meter pilfering as a business. Birmingham is only one instance of widespread robbery, which seems to have become universal, and in places in a manner that is somewhat appalling. Prominence has been given, within the last week or two, to two other instances. In the half-yearly accounts of the South Metropolitan Company was this striking item: "Stolen from 4143 slot meters broken open, £465 2s. 5d." The gravity of the statement lies as much in the number of robberies and in the number of meters damaged as in the sum of money actually and criminally appropriated. At the half-yearly meeting of the Tottenham and Edmonton Company, Mr. Corbet Woodall, remarking on the growth in the number of prepayment meter users, also pointed out that the number of thefts from the cash-boxes was growing disproportionately. In 1906 there were 362 robberies, and in 1907 774—in other ...rds, the number more than doubled in the year. T... ...sing robberies involve much time, worry, and ... for increased vigilance on the part ... ...me at the Police Courts w...

(From the "JOURNAL OF GAS LIGHTING" of Feb. 25.)

CAN BE FITTED TO OUR
POSITIVE PREPAYMENT METER.

COLSON'S
PATENT
CASH BOX
IS THE
ONLY COMPLETE
SAFEGUARD
AGAINST THEFT OF THIS KIND.

SAWER & PURVES,
MANCHESTER, NOTTINGHAM, GLASGOW.

seen; and this feature, combined with the excellence of the fare provided by the President, will help to make this year's gathering a memorable one.

The concluding item of business of the Eastern District of the Scottish Junior Gas Association for the session consisted in a visit to-day to the Corporation gas-works at North Berwick. The works are almost new; having been opened in October, 1904. The Engineer was the late Mr. James M'Gilchrist, of Dumbarton. The works are in every way fulfilling expectations. The Manager—Mr. J. Black—in going round with the Association, pointed out several additions and alterations he has made, which improve the efficiency of the works. The principal change he has made is the adoption of oxide of iron as the chief agent in purifying. He is satisfied, even gratified, at the result of the change he has made. He has been able to pass through the winter without opening any of the boxes. Another item which was shown the visitors, and in which they were very much interested, was the working of the patented arrangement of Messrs. Alder and Mackay, of Edinburgh, for the lighting and extinguishing of the public lamps. All the lamps in the burgh have been fitted with the arrangement, and the time occupied in lighting the whole of the burgh is only 30 seconds. The arrangement is such that the bulk of the lamps can be turned out at whatever hour is desired, leaving a few to burn all night; and these are dealt with in the same way when daylight comes in. The system works very sweetly, and is a great convenience, as well as a saving. The members of the Association, when they saw how promptly the lights went up, were loud in its praises. Now that they have concluded their winter's programme, the Association are to be congratulated upon the work they have been able to accomplish, both at their quarterly meetings and upon the visits they have made, all of which have been pleasant and useful.

The Edinburgh and Leith Gas Commissioners had before them on Monday the subject of the provision of pensions for their workmen. Bailie Bryson, the Convener of the Works Committee, moved approval of a recommendation that the Commissioners adopt the principle of giving 6s. per week for twenty years' service, and 2d. per week for every further year's service. An amendment by Mr. M'Kelvie, of Leith, that each case be considered on its merits, was not seconded; and the recommendation was adopted—the matter being remitted to a Committee for report.

On the same day, the Cleaning and Lighting Committee of the Edinburgh Town Council had before them a communication from the Gas Commissioners, offering to supply gas for public lighting during the ensuing year at the rate of 2s. 8d. per 1000 cubic feet for flat-flame burners, and 2s. 9d. for incandescent lamps. The Committee were of opinion that "in a number of the streets" electric light could be used more cheaply than gas; and they agreed to recommend that in four thoroughfares electric lighting should be substituted for the present incandescent gas. It was remitted to the Resident Engineer to prepare a plan showing streets in the centre of the city where a saving could be effected if gas were replaced by electric light.

On Monday evening, about seven o'clock, the gas supply of the burgh of Johnstone failed for about two hours, owing, it is believed, to water having got into a main at the gas-works. The supply was restored by nine o'clock.

I mentioned recently that two actions had been brought in the Sheriff Court against the Corporation of Falkirk, by occupiers of land adjoining the gas-works, in which compensation is sought for alleged damage to crops, said to have been caused by the defenders having permitted noxious fumes to escape from their works. In one of these, Sheriff-Substitute Moffat has ordered a proof. In a note to his interlocutor, he says that the defenders pleaded that because they are carrying on work authorized by an Act of Parliament they cannot be held to be responsible for damage caused by them, unless negligence on their part be averred and proved. They relied upon the rule of law laid down by Lord Blackburn, to the effect that it was thoroughly well established that no action would lie for doing that which the Legislature had authorized, if it were done without negligence, although it did occasion damage to anyone. The pursuer argued that this was not applicable, and cited the provisions of the Gas-Works Clauses Act of 1847, which enacted that "nothing in this or the Special Act contained shall prevent the undertakers being liable to an indictment for nuisance or to any other legal proceeding to which they may be liable in consequence of making or supplying gas;" and the Gas-Works Clauses Act of 1871, which enacted that "nothing in this or the Special Act shall exonerate the undertakers from any indictment, action, or other proceeding for nuisance in the event of a nuisance being caused by them." These provisions, incorporated in the defenders' Act, seemed to him to be conclusive. They took the case altogether out of the rule of law and the numerous cases in its support referred to. He had no hesitation in holding the action to be relevant. With regard to the defenders' plea that the action is barred by the Public Authorities Protection Act of 1893, he thought that the pursuers' condescendence could be read as an averment of continuous damage. Although there were averments of specific damage to separate crops, yet the acts complained of were alleged to have been going on over a period of time. Of course, if it should appear after proof that the case was not one of continuous damage, or that all damage was done six months before the raising of the action, the Act would apply. Consequently, it was proper to reserve the effect of the defenders' plea to this effect till after proof. It is anticipated that in the other action the same order will be pronounced. The decision of the Sheriff-Substitute is liable to be reversed, on appeal. If it should be sustained, and the cases, which will likely be taken together—or the one case held to rule the other—go to proof, the evidence will be interesting, and the trial a costly one.

The Arundel Gas Company are at present sending out 2 million cubic feet of gas less than they were distributing twelve years ago, owing to void properties and other causes. In the last half year, however, the output of gas increased to the extent of 1·1 per cent. (a total of 178,700 cubic feet). The receipts were £4149, as compared with £4006 in the second half of 1906.

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CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia.

LIVERPOOL, *April* 4.

March closed with an active demand for spot and near delivery, and this has been sustained in April, so that the market has been kept bare of stocks, and prices have been further advanced at all points. The closing prices are £12 5s. per ton f.o.b. Hull, £12 7s. 6d. to £12 8s. 9d. per ton f.o.b. Liverpool, and £12 10s. per ton f.o.b. Leith. Buyers abroad do not yet realize the alteration in the situation within the past few weeks, and for the most part they are still behind the market. The buying, therefore, has again been mainly for covering heavy sales made in advance and for supplying good home demand. The firmer spot market has reflected itself upon the forward position, and £12 7s. 6d. per ton is now generally required for July-December delivery, though it is understood that during the week sales have been made at £12 5s. per ton delivered f.o.b.

Nitrate of Soda.

This article remains quiet with only a moderate demand, unseasonable weather having delayed agricultural operations. The closing spot prices are 10s. 9d. and 10s. 10½d. per cwt. for 95 per cent. and refined qualities respectively.

Tar Products.

LONDON, *April* 6.

The markets are quiet all round, with little business doing. Pitch remains in about the same position. In London, business has been done at 20s. 6d. per ton; while on the east coast 19s. is reported to have been accepted. In Liverpool, there are sellers at 20s. Forward business seems impossible when the present ideas of buyers are taken into consideration. Benzols are still quiet. On the east coast, sales are reported at 7⅜d. In toluol, no business is reported. Solvent naphtha is quiet. There are sellers at 10d. to the end of the year in London; while 100 flash heavy naphtha has been sold at 11d. Creosote is quiet all round. Business has been done in London at 2⅜d.; and in one instance equal to 2½d. is reported to have been accepted for a large quantity. In the Midlands, oil is still fairly firm; but in the North 2½d. has been accepted. Naphthalene is steady; but salts are lower in value. Carbolic acid is unchanged. Dealers continue to give better prices than are offered by the Continental consumers.

The average values during the week were: Tar, 12s. to 16s. *ex* works. Pitch, London, 20s. to 20s. 6d.; east coast, 19s. to 19s. 6d.; west coast, 18s. 9d. to 19s. 9d. f.a.s. Benzol, 90 per cent., casks included, London 8⅛d. to 8⅜d., North 7⅜d. to 8d.; 50-90 per cent., casks included, London 8d. to 8⅛d., North 7¼d. to 7⅜d. Toluol, casks included, London 9⅛d. to 9⅜d; North, 8d. to 8⅛d. Crude naphtha, in bulk, London 3⅛d. to 3⅜d., North 3d. to 3⅛d.; solvent naphtha, casks included, London 10d., North 9d. to 9⅛d.; heavy naphtha, London 10⅜d. to 11d., North 9⅜d. to 10d. Creosote, in bulk, London 2⅛d. to 2⅜d., North 2⅛d. to 2¼d. Heavy oils, in bulk, 2⅜d. Carbolic acid, 60 per cent., casks included, east coast 1s. 6⅜d. to 1s. 7¼d., west coast 1s. 6⅛d. to 1s. 6⅜d. Naphthalene, £4 10s. to £8 10s.; salts, 35s. to 37s. 6d., packages included and f.o.b. Anthracene, "A" quality, 1⅛d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is very firm indeed, and high figures have been paid all over the country for April delivery, which month there appears to be a decided shortage. The principal London Gas Company's report having realized £12 7s. 6d. for prompt. They now quote £12 10s., and have little to sell. Ordinary London makes have fetched £12 5s. to £12 6s. 3d. In Hull, £12 5s. to £12 7s. 6d. has been paid; and in Liverpool £12 6s. 3d. to £12 8s. 9d. In Leith, business is reported at £12 10s.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The general conditions governing the Lancashire coal trade show no change. The demand for house and steam coal continues steady. Less fuel, however, is required for smelters; and slack of inferior quality is a little easier for buyers who do not want it. Furnace coke, too, is slightly in favour of purchasers. Gas makers are seeking the best contracts available; but colliery owners are not disposed to make any concessions. Until the fate of the Eight-Hours Bill has been determined, no changes are likely to be made in coal prices. The average rates are unaltered.

Northern Coal Trade.

The coal trade of the North is very active. The shipments are extremely full for this season of the year; while some of the collieries have now sold a large part of their output for some weeks to come. The steam coal trade is brisk; and the prices are growing firmer as the approach of the Baltic season is more rapid. Best Northumbrian steams are rather higher in price at from 13s. to 13s. 3d. per ton f.o.b., second-class steams are 11s. 6d., and steam smalls from 7s. to 7s. 6d. Work at the collieries is full, and the production is very well taken up; the exports being far above the usual rate. In the gas coal trade, the home consumption is now much less; but the increase of the foreign demand makes up for the loss, so that pits are well placed generally for orders. As to current prices, Durham gas coals are quoted generally from about 10s. 6d. to 11s. 6d. per ton f.o.b., according to quality, and special classes are about 12s.; but there is rather more fluctuation in the values just at present. In contracts, something more is negotiating as to the Metropolitan supplies; some tenders having been submitted for a large part of the supply. It is said that these tenders are based on a price of from 10s. 6d. to 11s. per ton f.o.b.; but these figures are based on rumours that may not be very reliable. It is now expected that in the course of a week something may be known as to results, or counter-offers, if made. The coke trade is firm; but gas coke shows some

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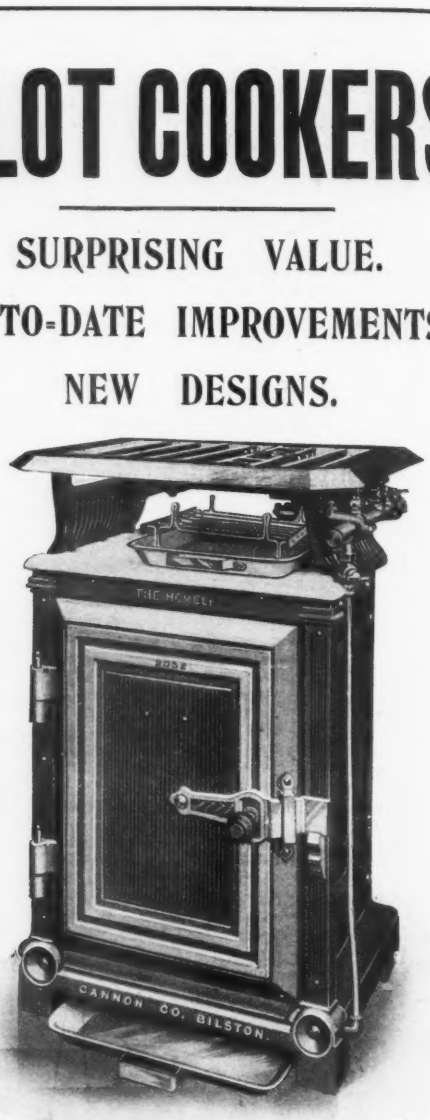

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ease. Newcastle gas coke is quoted from about 14s. to 14s. 6d. per ton f.o.b.

Scotch Coal Trade.

Current trade is very quiet; but now, when prices have come down considerably, there is more activity in the matter of forward selling. Coalowners are cherishing the hope that this branch of their business will improve. The prices quoted are: Ell 10s. 3d. to 11s. 3d. per ton f.o.b. Glasgow, splint 11s. to 11s. 3d., and steam 10s. 3d. to 10s. 6d. The shipments for the week amounted to 248,282 tons—an increase of 3880 tons upon the previous week, but a decrease of 47,047 tons upon the corresponding week of last year. For the year to date, the total shipments have been 2,750,635 tons—a decrease of 398,809 tons upon the corresponding period of 1907.

Gas-Coal Contracts.

A correspondent writes to the "Financial Times" as follows: The settlement of gas coal contracts this year promises to be more interesting than usual, and will undoubtedly reveal some extreme views on each side. The owners' point of view is that the basis worked on must be the same pit prices as last season, with an advance of 1s. 6d. per ton to operate from the passing of the Eight-Hours Bill; but it is doubtful if they will be able to maintain this position, as even now it is reported that the Stockport Corporation have bought their supplies at an average of 6d. per ton less than last year. In addition, several prominent gas managers are contemplating getting far better terms as the market becomes undermined by the special lots of coals and nuts now being offered by many collieries at clearance prices. Another far-reaching influence is that several large contracts for the gas-coal supply of some of the chief Continental cities, which in 1907 were placed in North Derbyshire and South Yorkshire, have this season been secured by the Westphalian collieries; thus rendering a considerably larger supply available for the home market. The casual shipments of gas fuels are also much smaller. It is anticipated that this year contracts will not be concluded until much later than the usual time. The consumer certainly will delay business as long as possible, for gas engineers are earnestly hoping that the Miners Eight-Hours Bill will be shelved before they have to sign their contract notes. The smaller consumers, too, will wait for the conclusion of negotiations by the largest London and Provincial companies; for these may be expected to make every effort to secure their supplies at the lowest possible figures. The London Companies are especially well able to play the game of bluff by their ability to take their supplies from Northumberland or Durham collieries, or *viâ* Hull or Grimsby from South Yorkshire, Derbyshire, or Notts, for each district in slow times is always anxious for a good sea-borne tonnage, which, when secured, places it in a position to exact better terms from the smaller gas corporations. If collieries can carry out the arrangement provisionally entered into, and insist on the same pit prices as last year, it will undoubtedly result in many works using cheaper fuels, such as unscreened coal and gas nuts, which, although not giving the same yield of gas, effect a considerable saving in first cost. Since the coal boom of 1900, the question of using lower-grade fuels has received the very careful attention of gas engineers.

Proposed New Water Supply for St. Ives.

After long consideration, the St. Ives (Cornwall) Town Council decided recently to proceed with a scheme for the improvement of the water supply and to seek powers to borrow £12,500 to carry it out. The existing sources of supply have been affected by mining operations; and it is intended to substitute for them a supply from Buesow Moor, from which source the town already draws a small quantity of water. Mr. A. P. K. Cotterell, M.Inst.C.E., of Bristol, who was called in to advise the Corporation, calculated that, on the basis of a permanent population of 7000 and a summer population of 2000 more, the quantity of water required is 200,000 gallons per day in winter and 250,000 gallons per day in summer. Towards this quantity 50,000 gallons per day will be obtained from existing sources, leaving 200,000 gallons to be provided from Buesow Moor. The average discharge from the stream at that place is calculated at 403,000 gallons per day; but in order to provide for a regular supply all the year round, it is necessary to construct a reservoir, which Mr. Cotterell recommends should be of a capacity of at least 14,000,000 gallons. He also recommends the Council to adopt a battery of pressure reservoirs in closed iron vessels. If allowance is made for an increase of 3000 in the permanent population, the reservoir should have a capacity of 22,000,000 gallons. He estimated the cost of the works for a storage reservoir of 14,000,000 gallons, with filters, the necessary piping, &c., at £11,400; and of a reservoir of 22,000,000 gallons, £14,640. The Town Council decided to construct a reservoir of 14,000,000 gallons capacity, but to put in extra foundation works in the proposed dam, so as to enable the reservoir to be enlarged in future if required; also to provide larger mains from the reservoir to the filter-beds and service reservoirs than Mr. Cotterell suggested. Provision will thus be made for an increase in the population of 2000 persons; and it will be an instalment towards the larger scheme.

Prescot Gas Company.—At the annual general meeting of this Company last Tuesday, the Chairman (Mr. Henry Cross), in moving the adoption of the report and accounts, said the shareholders were to be congratulated on the financial result of the past year's working. It was gratifying to the Directors and shareholders alike that, notwithstanding the great advance in the price of coal, the profit for the year was £120 more than in 1906. This was in a great measure due to the installation of a water-gas plant in 1905, and also to the good price realized for coke and sulphate of ammonia. Coals cost £125 more than in 1906; but residuals had realized £167 more. The cost of gas into the holder (if extraordinary expenditure on repairs was eliminated) was 2½d. per 1000 cubic feet less than in 1904, when only coal gas was made. The Chairman also announced that the Directors had decided to reduce the price of gas 1d. per 1000 cubic feet to all consumers from the 1st inst. The report was adopted, and the maximum statutory dividends were declared.

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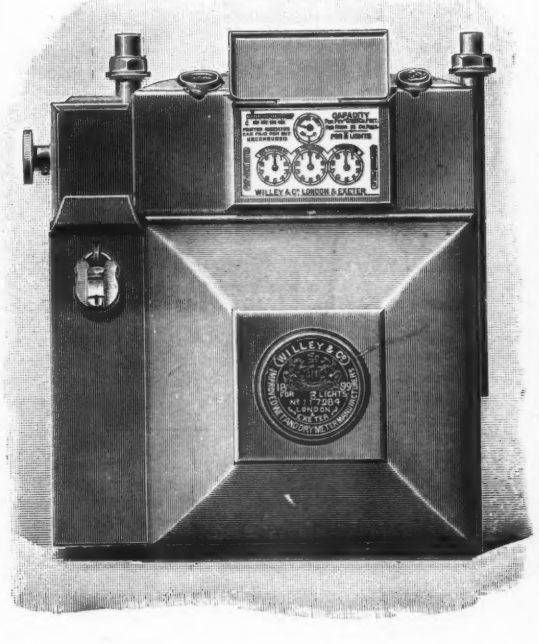

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Reduction in the Price of Gas in the Potteries.

A special meeting of the Stoke-upon-Trent Town Council was held on Monday last week, for the purpose of considering the prices now being charged for gas and electricity by the Corporation to consumers within the limits of supply. Alderman Geen said the Gas Committee had met that afternoon, and resolved to recommend to the Council that the charges per 1000 cubic feet for gas for the current quarter and for the future be as follows: By ordinary meters, 2s. 9d., subject to a discount of 6d. per 1000 cubic feet for payment within a month of the delivery of the account; by slot meters, 3s., subject to a discount of 6d. per 1000 feet on collection; by ordinary meters for motive power, 2s. 9d., subject to a discount of 9d. for payment within a month; and for public lighting, 2s. 3d. The previous charges were: For ordinary meters, 3s. 4d., with 6d. discount; for slot meters, 3s. 4d., with 2d. discount; and for motive power, 3s. 4d., with 10d. discount. The Committee's recommendation was unanimously confirmed. The Fenton Urban District Council have given notice that in future the price of gas will be reduced to all consumers—*i.e.*, the discounts will be increased to 1s. 3d. per 1000 cubic feet, making the net price 2s. 1d. The Gas Committee have under consideration the question of supplying gas free for the public lighting. The Burslem Town Council, following the examples of the above-named Councils, have met in Committee, and decided to lower the price of gas as from Jan. 1 last. Ordinary consumers will be charged at the rate of 2s. 6d. per 1000 cubic feet, with a discount of 6d. on accounts paid within a month of delivery, against 2s. 8d., with 2d. discount as heretofore. Slot-meter consumers and users of gas-engines are to have a proportionate reduction in the price of their gas.

"Co-Partnership with a Vengeance."

Under the above title, "G. L." contributes the following story to the current number of the "Co-Partnership Journal" of the South Metropolitan Gas Company: "The gas company in an important English town recently offered co-partnership to its employees, who willingly accepted it, and the first bonus will be given later in the year. The bonus is to be governed by the price of gas on the same principle as ours. The town has its Mayor, Aldermen, and Councillors, and, of course, a local newspaper, in which the doings of the corporation are reported. Two or three weeks ago, a town councillor, a tobacconist by trade, proposed that electricity should displace gas in the public lamps. This was, of course, reported in the local paper, which is evidently read by the young co-partners of the gas company, and not only read but inwardly digested. What they thought and said I do not know, but it can be imagined. I have been told what they did; and doing is the proper outcome of thinking. A deputation of these workmen was sent to interview the tobacconist councillor, and began by informing him that they had read a report of his speech on the question of doing away with gas in the public lamps. Well, what was that to them? They said they worked at the gas-works. That, he said, made no difference. 'But,' said they, 'it is against our interest.' 'Well,' said he, 'I cannot help that.' 'Very well,' was the reply, 'nearly one hundred of us buy our tobacco at your shop, and we have made up our minds not to buy another ounce of you if this matter is not dropped.' This was, no doubt, reported to their fellow-workmen; and then a hundred or more held a meeting at the works, and, after talking the matter over, resolved that they would purchase none of their domestic supplies from tradesmen who use the electric light. Now, these co-partners have never yet had a bonus. What they will be when they are holders of a good amount of stock remains to be seen. I told this story to some friends last week. One, a City merchant, said it was quite right, and just like men in business acted in their dealings, for one good turn deserves another; and another thought it rather a strong line to take with the tobacconist. I tell the story, however, to show the educative effect of co-partnership on these apt learners employed by the gas company of a provincial town."

Explosion at the Bristol Gas-Works.—While some men were engaged last Tuesday in the repair of an underground tank at the Bristol Gas-Works, an explosion occurred, and three of them were injured and had to be removed to the infirmary. A large hole was torn in the ground by the explosion, which caused considerable alarm in the neighbourhood.

Fatal Accident at the Heckmondwike Gas-Works.—A labourer at the Heckmondwike Gas-Works, named William Egan, was killed last week while assisting in the removal of a purifier cover, which was being raised when the pulley chain slipped. The cover fell to the ground; Egan being crushed beneath it. When released, he was in a terribly mutilated and dying condition.

Gas Explosion in Dublin.—A slight gas explosion occurred last Friday week in Dublin while a foreman and three other employees of the Gas Company were engaged in repairing the main in Duke Street. They tapped the main, and the gas which escaped was set on fire by a hand-lamp which one of the men carried. The men were stunned by the explosion, but not seriously injured. No damage was caused.

Gosport Water Supply.—The Directors of the Gosport Water-Works Company have decided to comply with the town's request for a constant supply; the yield from the new source at Soberton being of the most satisfactory character. The plan hitherto has been to shut the water off at 11 o'clock at night. The alteration will remove the fear of an extensive outbreak of fire which has existed in the past.

Nelson Water Supply.—The Nelson Town Council last Wednesday discussed the question of the town's water supply, and decided to construct a reservoir with a storage capacity of 160 million gallons, which is expected to take four years to build. Mr. Newton, of Manchester, is to be the Engineer. In order to meet the additional cost, the Council have revised the charges for water. Under the new arrangements, 4500 consumers will have increased charges to pay; the altered scale affecting very considerably the occupiers of the best kinds of property, but only slightly the tenants of small cottages.

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Electric Light Failure in a Taunton Church.—During a confirmation service in St. James's Church, Taunton, last Thursday evening, the electric lights in the church, with the exception of those in the chancel, suddenly became extinguished. The mishap was due to the connecting wire having become defective; but it was soon remedied, though the lights in the chancel had to be turned out for a few minutes while the necessary repair was being done.

Parliamentary Expenses of the London County Council.—The report of the Local Government Board Auditor on the accounts of the London County Council for 1906-7 states that the parliamentary expenses incurred by the Council during the five years ending with the year named amount to no less than £139,682. Of this, £78,703 was in respect of the promotion of Bills, and £60,979 for opposition. The abortive Electricity Supply Bill of 1906—the last of the Progressives' work in this line—cost £6700.

Lincoln Municipal Undertakings and the Rates.—Mr. C. W. Pennell, the Chairman of the Lincoln Finance Committee, dealing with the estimates for the ensuing year, said that there would be £6610 deficiency on the water-works to provide for; but, on the other hand, there would be available sums of £3500 granted by the Gas Committee and £1000 by the Electricity Committee. The total income from all the Corporation undertakings was £190,706; and the gross expenditure was £186,958, during the year. The total borrowings of the Council were £798,556, of which £226,000 had been now repaid. Against the remaining £572,500, they had property valued at £976,000, which was equivalent to £18 4s. per head of the population.

Devon Gas Association, Limited.—The second annual meeting of the Association was held in Exeter last Tuesday. The Association own gas-works at Chagford, Chudleigh, Moreton Hampstead, and South Brent. The works at the three first-named places have recently been brought up to date by the addition of fresh plant, mains, &c.; and those completed at South Brent are entirely new. They comprise the most modern apparatus for gas making, and were carried out successfully by Messrs. Willey and Co., Limited. The Directors declared a dividend of 5 per cent. for the past year—the first full working year of the Association—which was regarded as satisfactory. There was an increase of nearly 40 per cent. in gas sold in comparison with 1906.

River Plate Gas Company, Limited.—The report of the Directors of this Company for the past year shows that the profit was £123,768, to which has to be added receipts from other sources amounting to £5557, and the amount brought forward (£25,247), making altogether a total of £154,572. After payment of all fixed charges, making ample allowance for bad and doubtful debts, and providing fully for the upkeep of the works, mains, &c., there remains £129,847. The interim dividend of 7s. per share, tax free, absorbed £35,000, £20,000 is placed to the reserve (raising it to £185,000), and £2052 to the pension fund. The Directors recommend a final dividend at the rate of 9s. per share, making 8 per cent. for the year, tax free; leaving £27,795 to be carried forward. During the year a sum of £20,718 was spent out of revenue on the upkeep of the works and mains, &c. The mains were increased by more than 21 miles (making a total of about 451¾ miles); and on balance 3404 new house services were connected with the system.

The Gas Committee of the Salford Corporation have accepted the tender of Messrs. Westwood and Wrights for the supply and erection of retort-house floors and retort fittings, together with steel mains, &c., at the Albion Street works, for the sum of £2772.

An inquiry has been authorized by the Parish Council at Horndean, Hampshire, relative to obtaining a water supply from the Portsmouth Water Company. It is considered that such a supply would be one of the greatest possible blessings. Horndean is reached from Portsdown Hill by a light railway some six miles in length.

It is recommended by the Finance Committee of the Manchester Corporation that the trading departments should contribute out of profits a sum of £5000 a year towards the fixed expenses of the Town Clerk's and City Treasurer's departments, which amount to £19,651. The contributions will include £1500 from the gas, £950 from the electricity, and £950 from the water department.

At the last meeting of the Twickenham District Council, the Finance Committee reported that the Clerk had been instructed to communicate with the Hon. Secretary of the gas conference of which the Council are members, requesting that the matter of the large accumulated balances in the hands of the Brentford Gas Company, and the possibility of securing a reduction in the price of gas, might be considered.

Messrs. Applegarth and Co., of Queen Victoria Street, E.C., have sent us their latest circulars referring to the Denayrouze respirator and the "Clarnico" chemical fire extinguisher. The former appliance is very useful in enabling firemen and others to enter and work in places filled with smoke, noxious fumes, deleterious gases, &c.; while the latter will throw a stream of chemical fire-killing fluid a distance of 30 to 40 feet.

During the present year, sixty prepayment meters belonging to the Sunderland Gas Company have been broken open and rifled; the bulk of the robberies taking place in houses that have just been vacated by the tenants. Some days since a man was sent to prison for three months for an offence of the kind. A constable was secreted in a house, and watched prisoner force open the meter and take out marked money. The offence was committed at Southwick, where a large number of meters have been robbed in this way.

According to the "Ironmonger," through difficulties experienced by the Vienna Municipal Council when arranging contracts for the supply of water-pipes, the establishment of a municipal ironfoundry in the city has been decided upon. The annual requirements of pipes amount to about 500,000 kronen in value. It is possible, however, our contemporary thinks, that the municipal foundry project is merely intended to intimidate the Austrian Iron Syndicate, who hold a practical monopoly of the supply of tubes in Austria, and to force them to lower their prices.

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Sole Agent for America:

E. C. Brown, "Progressive Age," No. 280, Broadway, New York.

A lecture on "Coal and its By-Products" was lately delivered by Mr. Fazakerley, the Chemist to the Whitwood Chemical Works, and Mr. E. H. Hudson, the Manager of the Normanton Gas-Works. Some apparatus (lent by the Whitwood Chemical Works) was fitted up on a platform; and with this the lecturers carbonized coal, distilled tar, and manufactured sulphate of ammonia. Except the retort, all the apparatus was of glass—the audience being thus enabled to see each process.

The Brentford Gas Company have arranged a series of gas exhibitions in their various districts—Southall, Hanwell, Hammersmith, Barnes, Twickenham, Chiswick, Ealing, and Hounslow. Each exhibition will be of a week's duration with cookery demonstrations twice daily. The exhibition at Southall was opened yesterday week by Mr. W. E. Eburne, J.P., the Chairman of the Southall Urban District Council. The following firms exhibited: Richmond Gas Stove and Meter Company, Davis Gas-Stove Company, Bland and Co., New Inverted Incandescent Gas-Lamp Company, and William Sugg and Co. A suite of rooms furnished by a local firm occupied one side of the hall, and were fitted up with the latest methods of lighting, gas-fires, and other gas appliances.

In moving the adoption of the report of the Directors of the New Inverted Incandescent Gas-Lamp Company, Limited, on Monday last week, the Chairman (Mr. Elie Hinton) said the net trading profit for the past year was some £390 less than for 1906; but the amount carried to the balance-sheet was £9279, or about £120 more. He thought the shareholders had every reason to be satisfied with last year's trading, which had been greater in volume than that of any preceding year. The reasons for the profits not having been proportionately greater were the higher price of metal in the first half of the year, and the reduction in charge for the burners. Notwithstanding this, however, the net profit was a trifle more than in 1906. For the information of those of the shareholders who had been discontented with the dividends declared in previous years, he gave a *résumé* of the Company's business from the commencement; adding that a study of the Company's balance-sheets showed that each year their position had been growing stronger. At the end of 1903, the excess of assets over liabilities was £2952; whereas at the end of last year it was £25,547. The profit and loss accounts showed that the profits had risen from £8371 for 15 months' working to the end of 1903, to £9290 at the close of the past year; the total profit earned during the five years of the Company's existence having been £40,253, which was more than half of the share capital issued. Out of the total amount of profit earned, the Directors would, including the 6½ per cent. dividend (instead of 5 per cent.) recommended, have distributed in dividends £16,848, all free of income-tax. This, he maintained, was a record with which, considering all the circumstances, both the Directors and the shareholders had every reason to be thoroughly satisfied. The Directors had utilized part of the profits in writing-down the patents, and they proposed to place £6500 to the reserve and carry forward about £1375. Mr. Henry Woodall seconded the motion, and it was carried. The dividend recommended having been declared, Mr. Woodall proposed the re-election of Mr. Elie Hinton as a Director; but on a show of hands the motion was lost. Thereupon Mr. Hinton said he had considered his position, and should retire. Mr. James Bridger, the General Manager, was then elected a Director.

"ILLUMINATING TRUTHS."

LEAFLETS FOR DISTRIBUTION.

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."
No. 5.—"On Reliability, with Instances of Misplaced Confidence."
No. 6.—"On Shop Lighting, with Special Reference to the Flame Arc Lamp."
No. 7.—"The Osram Lamp: Fiction and Fact."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments in defence of the commodity in which they have invested capital. Copies of each Leaflet should also be kept in every Gas Undertaking's Show-Rooms.

Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER (COKE-OVEN BUILDERS, &c.). No. 4923.
REPRESENTATIVE. Strache Water Gas Society, Vienna.
CANVASSERS, &c. No. 4928.

Situations Wanted.

MECHANIC AND PATENTEE. No. 4929.

Partnership and Directorship Wanted. No. 4921.

Instruction in Gas and Fuel Analysis.

SIR JOHN CASS TECHNICAL INSTITUTE.

Plant, &c. (Second-Hand) for Sale.

GAS ARC LAMPS. Receiver, Block Light, Limited.
PHOTOMETER. Receiver, Block Light, Limited.
PURIFIERS, SCRUBBERS, ENGINES AND EXHAUSTERS, BOILERS, RETORT-BENCH MOUNTINGS, &c. British Gaslight Company, Etruria Tenders by April 30.
RETORT-HOUSE PLANT, CONDENSERS, PURIFIERS, WASHER, ENGINE, EXHAUSTERS, STATION METER, &c. Aberavon Gas Department. Tenders by May 14.

Stocks and Shares.

ALDERSHOT GAS AND WATER COMPANY. April 14.
BEXHILL WATER AND GAS COMPANY. April 13.
GRAYS AND TILBURY GAS COMPANY. April 14.
HORLEY GAS COMPANY. April 14.
NEWCASTLE AND GATESHEAD WATER COMPANY. April 14.
NEWHAVEN AND SEAFORD WATER COMPANY.
SOUTHGATE GAS COMPANY. April 14.
WALTHAM ABBEY AND CHESHUNT GAS COMPANY. April 24.

Tar-Works Wanted. No. 4930.

Licences to Work Under Patent.

SINKING WELLS, &c. Haseltine, Lake, and Co., Southampton Buildings, Chancery Lane, W.C.

TENDERS FOR

Benzol.

BRIDGEWATER COLLIERIES COKE-WORKS. Tenders by April 13.
WIGAN GAS DEPARTMENT. Tenders by April 13.

Brass and Copper Tube and Fittings and Lead Pipe.

WIGAN GAS DEPARTMENT. Tenders by April 13.

Coal and Cannel.

COMMERCIAL GAS COMPANY. Tenders by April 9.
DEVONPORT GAS DEPARTMENT. Tenders by April 13.
DRONFIELD GAS COMPANY. Tenders by April 13.
EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by April 13.
KINGS LYNN GAS COMPANY. Tenders by April 16.

Fire-Clay Goods.

YSTALYFERA GAS-WORKS.

Gasholder and Tank.

MILNROW GAS COMPANY. Tenders by April 14.

General Stores, Tools, Implements, Ironmongery, Iron and Steel, Oils, Paints, &c.

EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by April 13.

Meters.

EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by April 13.

Oil for Gas Making.

EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by April 13.

Pipes, &c.

CHORLEY GAS DEPARTMENT. Tenders by April 21.
WIGAN GAS DEPARTMENT. Tenders by April 13.

Pipes (Wrought and Cast) and Castings.

EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by April 13.

Retort Bench, &c.

YSTALYFERA GAS-WORKS.

Sulphuric Acid.

BURY GAS DEPARTMENT. Tenders by April 18.
WIGAN GAS DEPARTMENT. Tenders by April 13.

Tar and Liquor.

COLNE GAS DEPARTMENT. Tenders by April 25.
WIGAN GAS DEPARTMENT. Tenders by April 13.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE,

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

THE KEITH LIGHT.

4800 INSTALLATIONS NOW IN USE.
SEE illustrated advertisement in next week's issue.
JAMES KEITH AND BLACKMAN CO., LTD., 27, Farringdon Avenue, LONDON. E.C.

PINCHBECK'S Meters and Burglar PROOF STRONG BOX.
See illustrated advertisement, March 31, p. I. of Centre.
J. PINCHBECK & Co., Adams Place, George's Road, HOLLOWAY, N.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

FIDDES-ALDRIDGE
SIMULTANEOUS Discharging-Charger.
The one Machine which Discharges and Charges at One Stroke.
See Advertisement March 31, p. IV.
ALDRIDGE AND RANKEN,
9, VICTORIA STREET, WESTMINSTER, S.W.
Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

OLD Gas-Works and Plant Dismantled by Competent Staff, and Best Prices Given for Old Materials.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

BRISTOL RECORDING GAUGES AND THERMOMETERS.

J. W. & C. J. PHILLIPS, 23, COLLEGE HILL, LONDON, E.C., and 7, PARK SQUARE, LEEDS.

TEMPERLEY TRANSPORTERS
FOR Rapid and Economical Handling of Coal and Coke in Gas-Works.
Next displayed advertisment will appear on April 21.
APPLEBYS LIMITED.
58, VICTORIA STREET, WESTMINSTER, S.W.
Telephone: 369 WESTMINSTER. Telegrams: "MILLWRIGHT" LONDON.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 Hop, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

BENZOL
AND
CARBURINE FOR GAS ENRICHING.

ALSO
THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, BISHOPSGATE STREET WITHOUT,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

NOTICE.

MESSRS. BLAND and Co., have had to seek the assistance of the Courts to establish their right to the exclusive use of their own name in Connection with their well-known Burners. The action has been disposed of on satisfactory undertakings being given not to make an unauthorized use of the name again, and on payment of an agreed sum for damages and costs.
BLAND AND CO., London and Manchester.

AMMONIACAL Liquor wanted.
CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

RETORT CARBON—I buy all qualities and Supply the Trade.
Write V. DASNIÈRES, 10, St. Mary Axe, LONDON, E.C.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

GAZINE—A radical Solvent and Preventative of Naphthalene deposits, and the Automatic cleaning of Mains and Services.
It is also used for the Enrichment of Gas, and has an illuminating value double that of 90 per cent. Benzol.
Supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY, WORCS.
Telegrams: "CHEMICALS, OLDBURY."

AMMONIA.
Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought.
J. WILSON, Pleasant Grove, York Road, King's Cross, LONDON, N.

WANTED, a position of Responsibility by Experienced MECHANIC and PATENTEE, with Practical and Commercial Experience in Heating, Lighting, Domestic, and other Apparatus. Capable of Designing and carrying out any Work in Metals, Developing Inventions, &c. Highest References.
Address No. 4929, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

BY adopting Cripps's Bye-Pass Valves inside your Purifiers, you can relieve the Back-Pressure in the Lower Tiers when the Purifying Material gets hard. They are extremely useful and economical.
Sole Makers: C. & W. WALKER, LIMITED, Midland Iron-Works, Donnington, near Newport, SHROPSHIRE.

PARTNERSHIP or Directorship wanted in a Sound and Progressive Business connected with the Manufacture of GAS-WORKS SUPPLIES, where £2000 to £3000 could be profitably invested, and where the active Personal Services of an Experienced Gentleman with valuable Business Connection would be suitably remunerated.
Inquiries to No. 4921, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CANVASSING—GAS-STOVE TRADE.
EXPERIENCED Interviewers required by First-Class Firm. Good Remuneration for Energetic Men.
Apply, with full Particulars, including Experience, &c., to No. 4928, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Qualified Engineer as REPRESENTATIVE for England, to do Business in Water-Gas Installations and necessary Apparatus. Large Commission allowed.
Address, with Full Particulars, Professor Dr. STRACHE, Society for the Utilization of Water Gas and Patents, Limited, Alserstrasse 71, Vienna VIII., AUSTRIA.

WANTED, an Engineer fully Experienced in the Design of Modern Coke-Ovens and Bye-Product Plants, to TAKE CHARGE, conjointly with the Principals, of the Technical and Commercial Departments of a Firm of Coke-Oven Builders.
Applications, with *copies* of Testimonials, and stating Age, Experience, and Salary required, to be sent to No. 4923, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TAR-WORKS Wanted to Purchase or Rent, in London District, or suitable Waterside Site with Rail convenient.
Address No. 4930, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—120 Complete Arc Lamps for Gas Lighting, together with 614 extra Mantles, suitable for Warehouse or Shop Lighting. Would be Sold in small Lots, or the whole quantity at cheap rate to purchase for Cash. Candle power, from 700 to 1000.
Address, RECEIVER, Block Light, Limited, Clifton Buildings, Worship Street, LONDON, E.C.

FOR SALE.—One Pentane Jet Photometer fitted with O'Connor's Test Meter and best Minute Clock. Been used for testing candle power and consumption of Gas. Tested by Board of Trade Standards' Department. Bought from J. Milne and Son. Hardly used. Total cost £51.
Replies to RECEIVER, Block Light, Limited, Clifton Buildings, Worship Street. LONDON, E.C.

WE have the following New and Overhauled Second-Hand PLANT FOR SALE:—
Gasholder, 8500 cubic feet, New Steel Tank.
Gasholders, 35 ft. by 10 ft.
45 ft. by 14 ft.
50 ft. by 16 ft., Telescopic,
Overhauled and re-erected in new Steel Tanks.
9-inch and 10-inch Condensers.
Kirkham Washer.
Walker's Purifying Machine.
Exhausters and Engines, Single and Combined, 2000 to 60,000 feet per hour.
Scrubber, 7 ft. diameter, 55 ft. high.
Purifiers, sets 6-fts., 10-fts., 20-fts.
Plans and Quotations of new Sets.
6-inch to 18-inch Station Meters, Governors, &c.
New Drums.
Tar and Liquor Pumps.
Producer-Gas Plants for 150 to 300 H.P.
All requisites for Gas-Works.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY (Yorks.).

TENDERS are invited for the Supplying and Erection of a Bed of Six RETORTS, including Arch, Ironwork, &c., for the Ystalyfera Gas Company.
Particulars to be obtained from R. B. SILCOX, PONTYCYMMER.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

MILNROW GAS COMPANY.

GASHOLDER.

THE Directors of the above Company are prepared to receive TENDERS for a TWO-LIFT TELESCOPIC GASHOLDER and STEEL TANK, 100 feet diameter by 25 feet deep.

Drawings and Specifications may be seen, and any other Information obtained, on Application to the Company's Manager, Mr. J. W. Bottomley, at the Gas-Works, Milnrow.

Sealed Tenders, addressed to the Chairman of the Company and endorsed "Tender for Gasholder," to be delivered not later than the 14th of April next.

The Directors do not bind themselves to accept the lowest or any Tender.

J. W. BOTTOMLEY,
Secretary and Manager.

Gas-Works, Milnrow,
March 21, 1908.

BRITISH GASLIGHT COMPANY LIMITED.
ETRURIA,
near STOKE-ON-TRENT.

THE Directors of the above Company are prepared to receive TENDERS for all or part of the Plant they have for Disposal at the Old Gas-Works, Etruria, Stoke-on-Trent, consisting of PURIFIERS, SCRUBBERS, ENGINES and EXHAUSTERS, BOILERS, RETORT-BENCH MOUNTINGS, &c.

Schedules of Plant and any Information relating thereto will be Supplied on Application to the Company's Engineer, Mr. J. R. Heath, Gas-Works, Etruria, near Stoke-on-Trent, with whom arrangements can be made to inspect the Plant.

The Directors reserve to themselves the right to accept any Tender in part or in whole, and do not bind themselves to accept the highest or any Tender.

Sealed Tenders to be addressed not later than Thursday, the 30th of April next, to

A. W. BROOKS,
Secretary.

Chief Office: 11, George Yard,
Lombard Street, London, E.C.
April 4, 1908.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

GAS COAL AND CANNEL.

THE Commissioners are prepared to receive TENDERS for the Supply of GAS COAL and CANNEL for Delivery at their Granton Works over a period of about Twelve Months from June 30, next.

The Monthly requirements during the period approximate the following ratio per cent. of Coal Contracted for.

July	4 per cent.	Jan.	15 per cent.
Aug.	5 ,,	Feb.	10 ,,
Sept.	6 ,,	March	8 ,,
Oct.	10 ,,	April	6 ,,
Nov.	12 ,,	May	5 ,,
Dec.	15 ,,	June	4 ,,

The Contractors must guarantee that in the execution of their Contracts they pay the Standard Rates of Wages, or such Rate as is Generally Recognized in their localities.

Further Particulars, with Schedule and Form of Tender, may be obtained on Application to Mr. W. R. Herring, the Engineer and General Manager of the Commissioners, at his Office, New Street, Edinburgh.

The Tenders to be lodged not later than Ten o'clock on Monday forenoon, the 13th prox., in sealed envelope addressed to the undersigned, and marked "Tender for Coal."

The Commissioners are not to be bound to accept the owest or any Tender.

JAMES M'G. JACK, S.S.C.,
Clerk.

25, Waterloo Place, Edinburgh,
March 25, 1908.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

GENERAL STORES.

THE Commissioners invite Tenders for Supplying the undermentioned GOODS:—

Cast-Iron Pipes and Connections.
Iron Castings.
Wrought-Iron Tubes and Fittings.
Merchant Iron and Steel.
Bolts, Nuts, and Rivets.
Tools, Implements, and Ironmongery.
Gas-Fitters' Stores, and Meters.
Timber, Yarn, Twine, Hemp, Waste, &c.
Paints and Oils.
Gas Oil.
Causeway Repairs.

Required for their Undertaking during the Year from Whitsunday next.

The Contractors will be required to guarantee that in the execution of their Contracts they pay the Standard Rate of Wages, or such Rates as are Generally Recognized as Fair in their localities.

Schedules and Forms of Tender, and all Further Information, can be obtained upon written Application to Mr. W. R. Herring the Commissioners' Engineer and General Manager, at his Office, New Street, Edinburgh.

Offers must be lodged not later than Ten o'clock on Monday forenoon, the 13th prox., in sealed envelope addressed to the undersigned, and marked "Tender for ———," as the case may be.

The Commissioners are not to be bound to accept the lowest or any Tender.

JAMES M'G. JACK, S.S.C.,
Clerk.

25, Waterloo Place, Edinburgh,
March 25, 1908.

DRONFIELD GASLIGHT AND COKE COMPANY.

THE above Company invite Tenders for 1500 Tons of Best Screened and Unscreened GAS COAL. The Coal to spread over the Twelve Months ending May 1, 1909, and to be delivered in such quantities, and at such times, as the Manager may from time to time direct.

Tenders, to be sealed and endorsed "Tender for Gas Coal," and to be sent to the undersigned by Monday, the 13th inst.

HAROLD WHITE,
Secretary.

BOROUGH OF ABERAVON.

SALE BY TENDER OF SECOND-HAND GAS PLANT.

THE Gas Committee invite Tenders for the following:—RETORT-HOUSE PLANT, CONDENSERS, PURIFIERS, LIVESEY WASHER, VERTICAL STEAM-ENGINE and Two ROTARY EXHAUSTERS, STATION METER, &c., &c.

Lists may be obtained from Mr. A. J. Bond, Manager.

Tenders, addressed to the Town Clerk, to be sent in by May 14 next, marked "Gas Plant."

The highest or any Tender will not necessarily be accepted.

M. TENNANT,
Town Clerk.

Aberavon, Port Talbot,
April 1, 1908.

BOROUGH OF COLNE.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Purchase of the Surplus TAR made at their Works during the Twelve Months ending March 31, 1909.

Particulars may be obtained on Application to the undersigned.

Sealed Tenders, endorsed "Tar," must be addressed to the Chairman of the Gas Committee, Gas-Works, Knotts Lane, Colne, Lancs., and delivered not later than Saturday, April 25, 1908.

The highest or any Tender not necessarily accepted.

FRED. THORPE,
Engineer and Manager.

Gas-Works, Knotts Lane, Colne,
Lancashire, April 3, 1908.

COUNTY BOROUGH OF DEVONPORT.
(GAS DEPARTMENT.)

THE Gas Committee of the Devonport Corporation are prepared to receive TENDERS for the Supply of GAS COAL, to be delivered in such quantities as may from time to time be determined previous to the 30th of June, 1909.

The Coal is to be delivered c.i.f. at Tamar Wharf, and Forms of Tender and Specification may be obtained from the undersigned.

The Committee reserve the right to accept Tenders for the whole or any portion of the quantity Offered, and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Gas Coal," and addressed to R. J. Fittall, Esq., Town Clerk, Devonport, are to be delivered at the Town Clerk's Office on or before Monday, the 13th of April, 1908.

By order,

JOSEPH WM. BUCKLEY, Assoc.M.Inst.C.E.,
Engineer and General Manager.

Gas-Works, Devonport,
April 2, 1908.

COMMERCIAL GAS COMPANY.

TENDERS FOR COAL.

THE Directors are prepared to receive TENDERS for the Supply of 200,000 Tons of Clean, Dry, Unscreened, Fresh-Wrought GAS COALS, delivered f.o.b. to the Company's Steamers at any suitable port during the Year ending the 30th of April, 1909.

The deliveries to be in about equal monthly quantities throughout the Year.

Payment in cash monthly.

Parties desiring to Tender for more than One Year must state separately the Price and Quantity offered for each Year.

Particulars and Forms of Contract may be obtained from the Engineer, Mr. S. H. Jones.

The Directors do not bind themselves to accept the lowest or any Tender.

Tenders, sealed and endorsed "Tender for Coals," to be addressed to the Chairman of the Coal Committee, and delivered at the Company's Offices not later than Nine o'clock on the 9th inst.

Commercial Gas-Works,
Stepney, E., April 2, 1908.

COUNTY BOROUGH OF WIGAN.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply of STORES over the Year ending on March 31, 1909, as follows:—

(*a*) Wrought-Iron Tube and Fittings.
(*b*) Brass and Copper Tube and Fittings.
(*c*) Lead Gas-Pipe.
(*n*) Cast Mains and Connections.
(*q*) Sulphuric Acid.
(*r*) Surplus Tar.
(*s*) Benzol, 90 per cent.

Forms of Tender may be obtained from the undersigned.

The Committee do not bind themselves to the acceptance of any Tender.

Tenders, sealed and endorsed with the name of the Article tendered for, to be delivered to Harold Jevons, Esq., Town Clerk, Wigan, on or before Monday, the 13th of April next ensuing.

A Sample of each Article to be forwarded, addressed to the Gas Engineer.

JOS. TIMMINS, M.Inst.C.E.,
Engineer, &c.

Borough Gas-Works,
March 27, 1908.

TO SULPHURIC ACID MAKERS.

THE Corporation of Bury invite TENDERS for the Supply of about 400 Tons of SULPHURIC ACID, for the Manufacture of Sulphate of Ammonia, during a period of One Year from the 1st day of May, 1908.

Forms of Tender and Conditions may be obtained upon Application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Sealed Tenders to be sent to the Town Clerk, Bury not later than Saturday, April 18, 1908.

KINGS LYNN GAS COMPANY.

TENDERS FOR COAL.

THE Kings Lynn Gas Company invite TENDERS for the Supply of about 7000 Tons of GAS COAL or NUTS. Delivery as required by end of May, 1909.

Prices may be quoted (*a*) f.o.b. the Company's Steamers in the Tyne or elsewhere; (*b*) f.o.r. Harbour Siding, Kings Lynn.

Tenders, endorsed "Coal," to be sent to the undersigned not later than April 16, 1908.

EDMUND G. SMITHARD,
Engineer.

Kings Lynn, April 1, 1908.

BRIDGEWATER COLLIERIES COKE-WORKS.
(THE EARL OF ELLESMERE.)

TENDERS are invited for the Crude BENZOL, testing 80 per cent. at 120° C., produced at the above Works for a period of Six or Twelve Months from the 1st of May, 1908, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley Branch of the Lancashire and Yorkshire Railway, or at the Brackley Siding on the Little Hulton Mineral Branch of the London and North Western Railway.

Tenders, endorsed "Tender for Crude Benzol," to be addressed to Mr. THOMAS M. BROWN, No. 4, Chapel Walks, MANCHESTER, on or before the 13th of April, 1908.

Manchester, March 17, 1908.

BOROUGH OF CHORLEY.
(GAS DEPARTMENT.)

THE Chorley Corporation are prepared to receive and consider TENDERS for the Supply and Delivery of 15-inch diameter CAST-IRON PIPES to their Gas-Works.

Specification and Form of Tender may be obtained on Application to Mr. J. W. Allin, Gas Engineer Chorley.

Tenders, endorsed "Cast-Iron Pipes," to be sent to me on or before Tuesday, the 21st inst.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
JNO. MILLS,
Town Clerk.

Town Hall, Chorley,
April 1, 1908.

THE Proprietor of the Patent No. 505 of 1902 for "IMPROVEMENTS IN THE SINKING AND CONSTRUCTION OF WELLS," is desirous of entering into arrangements, by way of LICENCE and otherwise, on reasonable Terms, for the purpose of Exploiting the same and ensuring its full Development and Practical Working in this Country.

All Communications should be addressed in the first instance to HASELTINE, LAKE, AND Co., Chartered Patent Agents and Consulting Engineers, 7 & 8, Southampton Buildings, Chancery Lane, LONDON, W.C.

NEWHAVEN AND SEAFORD WATER COMPANY.

NOTICE is Hereby Given, that the Directors of the above Company intend to Offer for SALE BY TENDER 200 ORDINARY SHARES, of £10 each (nominal value).

Full Particulars and Form of Tender may be obtained from the SECRETARY, Claremont Road, SEAFORD.

BEXHILL WATER AND GAS COMPANY.

SALE BY TENDER OF ORDINARY SHARES.

THE Directors Give Notice, that they will be prepared to receive, not later than Twelve o'clock at noon on Monday, the 13th day of April, 1908, Sealed TENDERS for 966 ORDINARY SHARES of £10 each; being a further portion of the additional Capital, the creation and issue of which was authorized under the powers of the Bexhill Water and Gas Order, 1901, by resolution of the Extraordinary Meeting of the Shareholders of the Company held on the 30th day of January, 1902.

The Shares will rank with the existing Ordinary Shares for a maximum Dividend of Seven per cent.

The lowest price at which Tenders will be accepted (which may not be less than par) will be deposited with the Board of Trade pursuant to the Order.

In the event of the receipt of Tenders at the lowest price accepted for a larger number of Shares than those proposed to be issued, such Tenders will be subject to a *pro rata* diminution.

Every purchaser will be required, on notice being given of the acceptance of his Tender, forthwith to pay to the Company the full price of the Shares sold to him, including any Premium; and if from any cause whatever such price shall not be paid on or before the 23rd day of April next, interest at 10 per cent. shall be paid thereon from that date until payment.

The registered holders of the Shares now sold will be entitled to dividend from the date of payment for same.

Forms of Tender can be obtained, personally or by letter, from the Offices of the Company.

By order of the Board of Directors,
ROBT. DOUGLAS JESTY,
Secretary.

Offices of the Company,
5, Sea Road, Bexhill-on-Sea.